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THE METROPOLITAN DISTRICT OF THE
MASSACHUSETTS DENTAL SOCIETY

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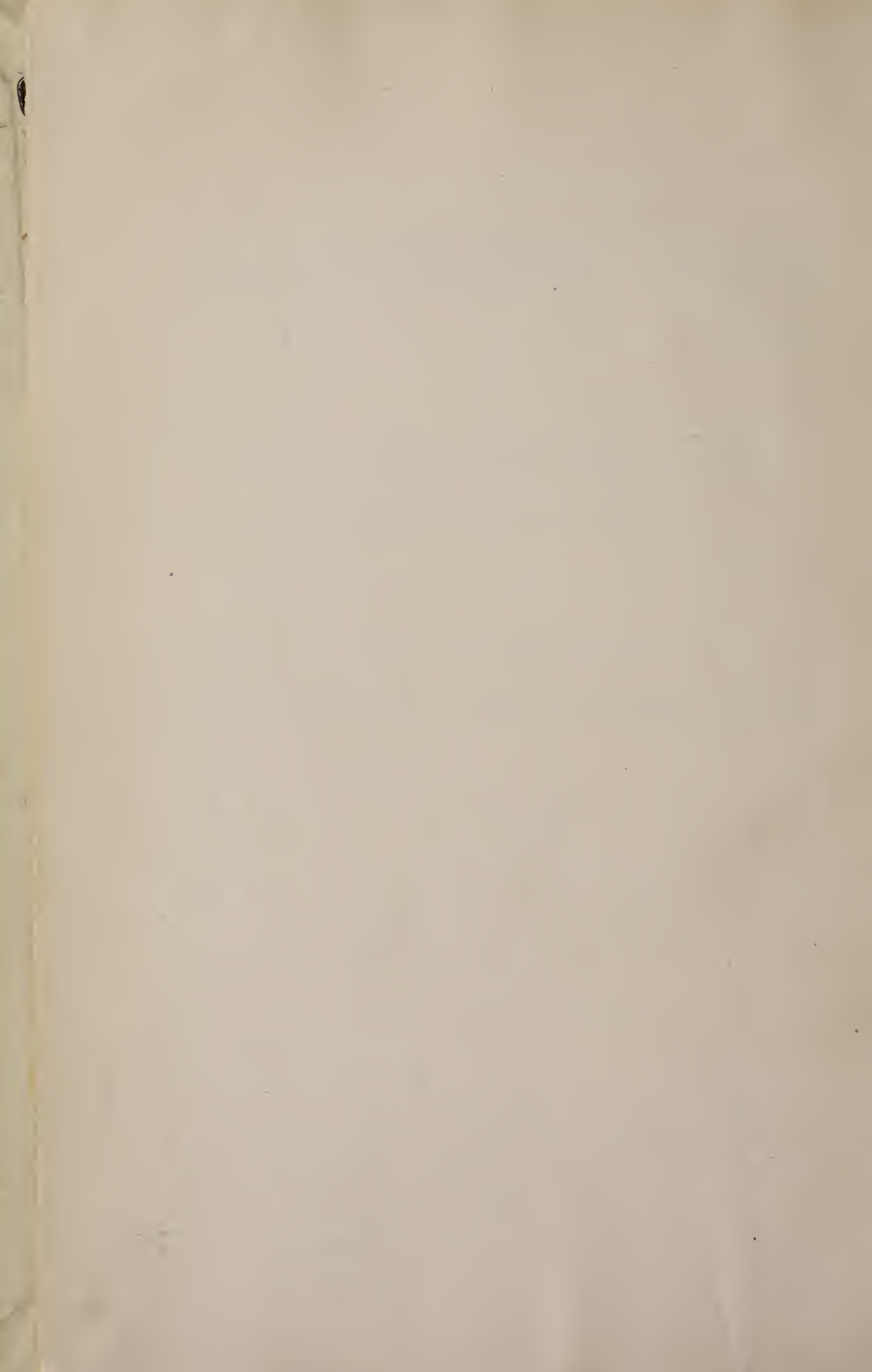
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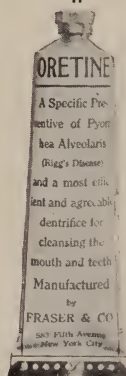
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VOL. X

MARCH, 1915

No. 1

THE AMERICAN AMBULANCE, PARIS

LETTER FROM DR. W. S. DAVENPORT.

[The following letter, addressed to the President of the First District Dental Society, is of especial interest in giving a first-hand account of the activities of a great military hospital. The heroic work now being carried forward by Drs. Hayes and Davenport is making a new record in dental and oral surgery.—Editor.]

6, AVENUE DE L'OPÉRA,
December 9, 1914.

My Dear President and Cousin:

Your letter expressing your deep interest and that of the members of the First District Dental Society of New York, in regard to the work done by the American Ambulance of Paris, is very much appreciated.

You are, no doubt, aware that the institution has been organized and maintained by voluntary contributions. Through the courtesy of the military government we were able to obtain a large college building nearing completion situated in Neuilly, Paris.

The building is admirably adapted to the purposes of a hospital and is under the military governor.

The idea of the work originated with Doctors Turner and Du Bouchet, with the co-operation of the staff of the American Hospital, which has been augmented by a number of well-known physicians and surgeons from U. S. A., including Doctors Blake, Derby and others. His excellency, Myron T. Herrick, the American Ambassador, gave his patronage, as well as many other well-known members of the American colony.

The committee who organized this work took possession of the premises about August 10th. By the first days of September the great work had been completed and the Ambulance was ready

with every modern appliance, including chemical, bacteriological, histological laboratories, surgeries for oculists, aurists and dentists, an X-ray installation, a magnetic appliance for the removal of shrapnel, besides three fine surgical operating rooms and everything that goes to the formation of an up-to-date hospital.

Those who attended the meeting of the American Dental Society of Europe in Paris, also the International Dental Congress, can only in a degree imagine the nervous strain through which the organizers of the Ambulance were passing until the battle of the Marne.

Our orders were for us to be in readiness at the first sound of the guns in Paris.

On the night of the 4th of September a very unusual thunderstorm awakened the staff of the Ambulance, mistaking the sounds for the firing of the guns. There was a unanimous rush to the hospital, only to find a false alarm! Very soon, however, the real sounds were heard in the distance and telephone messages were received from the general army medical staff. Our fourteen motor-ambulances were kept busy bringing in the wounded, which included French, English, North Africans and Germans.

The American Ambulance was fortunate in having as its chief surgeon Dr. Du Bouchet, an American with years of experience in French and Russian hospitals, both his father and brother being dentists. He had a special appreciation of the importance of the dental department, and gave the dental staff, with Dr. G. B. Hayes as chief dental surgeon, all possible authority and encouragement.

It would be premature at present to make any scientific report on what has been accomplished to date, as our most efficient surgeons are scarcely equal to the complicated problems which modern warfare forces upon them, and classic methods can seldom be applied.

Were it not for X-rays, I fear the task would be almost hopeless.

I have seen a man with over one hundred wounds; another with his jaw fractured, leg blown off, and his arm badly wounded—and all that, without having fired a gun or even having seen the enemy!

We have had a few cases actually in the hands of all our specialists.

I shall not go further into the horrors of warfare in general, but confine myself more to our specialty. Either our hospital is becoming known as being equipped with a dental department, or the trench fighting is resulting in an endless number of head wounds, for we are being occupied with any number of fractures of the maxilla; which I might add is even of lesser importance than the horrible condition in which we find the mouths, in a general way, of many, especially the English soldiers in the regular army.

I have a record of two cases in which only two teeth met, and there was a pulp exposure as well in each of the cases. The men were in a most debilitated condition owing to the fact that they were often unable to eat their hard-tack biscuits, unless they could soak them in water, which was often taken from the river.

They report losing their teeth in his Majesty's service without even being given the time or opportunity for any dental attention.

I am not sure as to the conditions existing in the German army; but as nearly as I can ascertain not one dental surgeon has been supplied to the armies now at war; and it is shocking to report the many "hors de combat" through diseased teeth, saying nothing of the suffering of the hundreds of thousands.

In accepting the position of dental surgeons to the American Ambulance, it was our request that dental inspection was to be given to every patient entering the hospital.

As far as possible a complete record is kept of all cases, including models, X-ray photos, photos before and after treatments, colored photographs of all special cases of interest, etc.

No teeth are extracted that can be treated and saved. All infected gums and abscesses are given special consideration; splints of all sorts and methods are being utilized to restore the normal condition of fractured jaws.

Many complications are caused by delay in getting the wounded into the hospitals. Multiple splintered bone conditions and endless shrapnel pieces, besides all sorts of debris found in the wounds, such as pieces of clothing, wood, dirt; in one case

we removed a collar stud, and even pieces of money have been found.

Our work is often delayed by more vital wounds, which necessitate refracturing to prevent permanent deformity.

I shall endeavor to give you a short description of some of the cases under treatment.

CASE 1.

Gun ball entered the cheek opposite the angle of the inferior maxillary, fracturing the body of the bone, and removing three molars, one bicuspid and a large portion of process, cutting off thirteen teeth level with the gums, six above and seven below, exposing all pulps, lacerating both lips with the accumulated dental debris on its exit, causing a wound often falsely attributed to the use of dum-dum bullets.

CASE 2.

A French commander, age 65 years.

Shrapnel ball entered at the left of the nose, cut away the turbinated bones, passed through the antrum, fracturing the superior maxillary, removing all the front teeth and the outer plate of the alveolar process of the inferior maxillary, tearing open both lips and crushing the anterior part of the symphysis; fractured pieces of teeth and bone were removed from the antrum and surrounding tissues. Two dentures restored the lost parts and the patient has returned to the front.

CASE 3.

An English boy, twenty years of age.

A piece of a shell cut a hole, half the size of one's fist, through both cheeks, taking out a third of the tongue and all teeth back of the canines, and nearly all the body of the inferior maxillary as far back as the rami. Seven teeth above and below had pulps exposed from the shock. We were able to retain the lower front teeth, thus preserving the mental process, which was also fractured into a pulp.

CASES 5 AND 6.

Lower front teeth and mental process shot away, the remaining portions of the jaw moving in all directions; both lips torn widely open.

Normal relations were restored and teeth replaced by means of a strong bridgework used as a splint.

CASE 6.

Gun ball entered the neck below the angle of the maxillary bone, passed through left sub-maxillary gland below the tongue, through the right sub-lingual gland, cutting away the bone and undermining the two right bicuspsids. The concussion of the ball fractured the lower arch (between the left canine and the right first molar) in at least four places. No teeth were lost, but the whole dental arch had to be forced to the left a half inch, and the teeth regulated and retained in position by the use of an Angle regulating fixture.

We have a number of cases where the whole cheek or nose has been blown open, with half the jaw above or below, or even both, gone, or being held only by soft tissue. This more serious class requires cast or swedged silver splints, when it is possible to do anything.

We are kept busy removing splinters of bone to prevent infection in fractured places.

I have removed at least twenty splinters from a region an inch in length.

It would take hours to describe all the cases we have under treatment.

Thanks to our Kingsley, Cryer, Claude Martin, Dillair, Martinier, and modern orthodontia, bridge construction, the use of inclined planes, and the old-time plate work, we feel our efforts are not without some results.

Dentistry in the army and navy in America is more appreciated than elsewhere; but let us not fail to use our influence on every possible occasion to bring about a more enlightened appreciation of the real importance of our work, not only in times of war, but in constant attendance to the men who are giving their lives for the safety of our country.

We hope to be able to make a complete report of our efforts later on, and, in the meantime, my dear cousin, please use this hurriedly prepared letter in any way you may see fit.

Very affectionately and fraternally yours,

W. S. DAVENPORT.

EPULIS¹

BY WILLIAM CARR, M.D., D.D.S., NEW YORK CITY

Those tumors to which the term "*epulis*" is applied, form an unique group, which deserves more consideration than has been accorded to them. Aside from mention in works on General Surgery and Pathology, and a few theses for the degree of Doctor of Medicine, they have received but little attention. The lack of interest in this class of tumors is, undoubtedly, due to their comparatively benign character; yet, from two standpoints at least, they are of considerable importance. The first of these concerns the preservation of the teeth and the contour of the alveolar process; the second, the very great importance of making a correct differential diagnosis between these tumors and other growths of a more malignant character, which occur within the mouth.

Etymologically, the word "*epulis*" means a tumor upon the gum, being derived from the Greek words "*epi*," upon, and "*oulon*," gum. The term was first used by the famous French surgeon, Ambrose Paré.

Its use in the broad sense—including cancer, sarcoma, vascular tumors, benign proliferations and even abscesses—was continued by Marjolin and Bernard. Giraldez first attempted to classify the tumors of the gums; and the distinction which he established was preserved by subsequent writers—Jean Müller, Rokitansky, Lebert and Robin—until Nelaton, in 1860, showed that the tumors now recognized as "*epulides*" have pathological and clinical characteristics sufficiently distinct to warrant the restriction of the term "*epulides*" to this form alone.

Pathologically, these tumors present unique characteristics, which are well represented by the section shown here. They are always pedunculated, and are covered with an epithelial layer, which is continuous with, and resembles in all respects, the epithelium of the oral cavity. The superficial layer of the epithelium is composed of flattened, squamous cells, staining a pale blue with hematoxylin, and each containing a poorly-defined

¹ Read before the First District Dental Society, S. N. Y., Jan. 4, 1915.

nucleus. The borders of the cells are shrivelled. The cells in the second layer are less flattened, much larger in size, and with larger nuclei, containing much chromatin and staining well. Their borders possess spines. At the depths of the folds into which the epithelial covering is thrown, this layer of cells measures 1 mm. in thickness. The epithelial cells of the deepest layer are cylindrical and form only a single layer—being set perpendicularly upon the basement membrane and very regularly arranged. The epithelial covering of the tumor is thrown into folds, which depend for their maintenance upon septa running through and dividing the tumor. The folds cause the surface of the tumor to appear lobulated, the various lobules averaging the size of a grapeseed.

The shape of the tumor, as a whole, depends upon the pressure conditions to which it is subjected. When appearing upon the anterior surface of the alveolus, it protrudes but little anteriorly, being flattened against the alveolus by the pressure of the lips. Under these conditions, it forms a broad, almost sessile, lobulated growth. Not infrequently these tumors grow beneath an artificial denture, and they may then be molded into many curious shapes. A very striking example of such an influence of pressure came under my observation last summer. The upper jaw was edentulous, and the tumor grew in the space formerly occupied by the central incisors of the superior maxilla, and had protruded itself backward between the hard palate and the artificial denture in the form of two long processes, which, when turned downward, resembled in a rough manner—in so far as external shape was concerned—a pair of horns.

The tissue constituting the tumor itself must be considered as contained entirely within the epithelial covering. The latter is merely the normal epithelium of the oral cavity lifted up; and, proliferating as a result of expansion from within, it furnishes a covering to the tumor tissue proper. The latter differs among different epulides in its density. Although there are all degrees of differences in this particular, epulides have been divided into soft and hard varieties. The difference between these forms depends largely upon the number of blood vessels which they contain, and examples of every intermediate form

may be encountered. An important significance has been attributed to the vascular contents of these tumors, and to the arrangement of the vessels within them. It has been maintained, for instance, that in the harder varieties of epulides, the blood vessels are distributed chiefly in the form of an interlacing network immediately beneath the layer of connective tissue stroma forming the basilar membrane upon which the deepest layer of epithelial cells rests, and that the tumor tissue proper is singularly free from vessels. On the other hand, in the softer varieties the vessels penetrate the whole tissue and possess a very intimate and significant relation to the peculiar giant cells, which are characteristic of these growths. Too sharp a distinction between the hard and the soft varieties of epulides on these grounds is not warranted by the various intermediate forms which exist.

The tumor tissue proper, contained within the capsule of mucous membrane and fibrous stroma immediately beneath it, consists of two important elements, aside from the supporting framework and the vessels which have already been mentioned. One of these elements consists of the spindle cells, twisting in various directions through the tumor, though in general collected in bundles, which are roughly concentric. Within each lobule of the tumor are numerous fusiform cells, resembling in shape certain stages of the development of the embryonal type of connective tissue cell. They measure approximately 25 to 30 microns, and possess well-staining, fairly large nuclei. In addition to these cells, which may be considered true sarcomatous elements, a second kind of cell is found dispersed throughout the tumor, which is characteristic of these growths. It is a large cell, measuring 120 to 150 microns in diameter, and containing anywhere from 3 or 4 to 20 nuclei—the average number being from 8 to 12. These cells have been called giant cells; but this term is misleading, since they can hardly be regarded as of quite the same significance as the giant cells found, for instance, in tuberculosis. At any rate, the large cells found in these two conditions present quite a different appearance. In tuberculosis, the cells stain poorly and the nuclei are situated eccentrically. In epulides, the nuclei are centrally located and stain well, as does also the cytoplasm of the cell itself. Because of these differences, the

French authors have preferred for these large cells the name "myeloplaxes" rather than giant cells.

Much interest attaches to the question of the origin of these cells. Many pathologists believe that they are derived from the bone marrow, or, in some way, related to osteoclastic cells. Little evidence exists in support of this view. They are not related to ossification centres, when the latter occur within the epulides. Other pathologists believe them to have originated from the endothelium of the blood vessels. In well-fixed specimens, it is possible to detect open spaces within the cells, some of which are empty, while others contain remnants of blood corpuscles, both white and red. In the vascular tumors these so-called myeloplaxes are closely related to the blood vessels; and, in places where the endothelial lining of the vessels is deficient, these cells may form a part of the wall of the dilated capillary, or minute vascular sinus. Moreover, bridge-like connections exist between these cells; so that an interlacing system of protoplasmic processes springing from the cells permeates the whole tumor—the cells themselves being evenly separated from each other. Altogether, the evidence is rather in favor of the claim, that these large characteristic cells are derivatives of a vascular cell.

Not infrequently, bony deposits may be found in epulides. They may occur as islands surrounded by a single row of cells, with a deeply-staining nucleus of fair size and acidophilic cytoplasm. These characters indicate that these cells surrounding the bony islands are, in all likelihood, osteoblasts.

The facts just mentioned comprise the most important pathological features of the epulides. These features are so characteristic and striking, that they may be termed "unique." In other words, in an epulis we have to deal with a very special form of tumor—one possessing a very definite character. For this reason, they have a very special interest.

No less well defined are their clinical characteristics. While they may occur spontaneously, or without apparent cause, this is by no means always true. Perhaps more frequently than otherwise, some trauma may precede their development. This trauma is usually in the form of some chronic irritation, such

as the presence of a decayed root of a tooth, or a poorly fitting artificial denture, or an improperly fitted crown—one, for instance, which impinges too forcibly upon the mucous membrane of the alveolar border. At least, I have found all these conditions preceding the development of such tumors, not only at the site of their growth, but also apparently related, in so far as time is considered, in their development.

On the other hand, it must be remembered that these tumors may not only spring from a perfectly healthy tooth socket, but they show a marked tendency to locate between the incisors, cuspids and bicuspid. From my clinical observations I can say that only a small percentage of cases occur between the first and second molars. I have never seen a case, nor, to my knowledge, has one ever been recorded, which has developed posterior to the molar teeth.² These facts would indicate some connection between their development and the fissures between the different portions of the maxillary bones. However this may be, the relation of the development of these tumors to trauma is too strong to be cast aside as an unessential factor in their causation; and the possibility of their development should be rightly classed as one of the dangers of careless work within the mouth.

Epulis may occur between the ages of eight and sixty years. It most frequently occurs, however, between the ages of twenty and forty years.

Males and females are about equally affected. It is less frequently observed in the colored races.

Of 130 cases reported by Stepinski, 64 grew from the superior maxilla and 66 from the lower maxilla. The two jaws, therefore, are equally affected.

The clinical course of these tumors may be said to be absolutely definite. It is always slow. For a time they gradually increase in size, and they may then remain stationary, or more slowly increase in size. Few have been known to attain a large dimension, probably because of accident or operative interference. Bloodgood knew of a tumor which was allowed to remain for four years without destroying bone. In other words,

² Trelot makes the statement, that he has never seen a case which did not occur either in the middle line, or, at least, not far from it.

the course of these tumors is essentially benign, and they may be considered devoid of an invasive character.

They appear first at the margin of the tooth socket—the pedicle being attached to the periosteum. They are very frequently, at first, posterior to the tooth. Increasing in size, they surround the tooth and appear upon the opposite side. As the growth increases, other teeth may be surrounded. They always, however, remain surface growths, never, except as a result of unusual pressure conditions, invading the bone beneath.

It is most important that the benign character of these tumors be recognized for two reasons: first, because it impresses the necessity of an accurate differential diagnosis; and, second, because it materially affects the proper course of treatment. To mistake these tumors for the more malignant sarcomas or epithelial tumors which may appear upon the alveolar process may mean serious consequences; but it does not involve as serious consequences as mistaking the more malignant tumors for epulides. A mistake of the first kind may mean an unnecessary sacrifice of the patient's tissues. From the patient's standpoint, this only amounts to an unnecessary deformity. On the other hand, a mistake of the second kind may mean a sacrifice of the life of the patient.

No excuse should exist, however, for making either of these errors, as the clinical appearance of epulides is characteristic. They are always pedunculated and finely lobulated. They are circumscribed and freely movable, not involving the lymphatic glands. If they are completely extirpated, there is no recurrence. They spring from the mouth of the tooth follicle. While the softer tumors bleed easily, the harder ones do not bleed, and, as a rule, they are not ulcerated. By pressure the teeth may be loosened or displaced, but never as the result of an ulcerative process in the tumor itself. As a rule, the location of the epulides is forward, in relation with the central incisors, which is a more unusual situation for the more malignant tumors. The rate of growth of the epulides is also much slower; and, at the age when epulides are most frequent, malignant epithelial tumors are most infrequent.

These differential characteristics of epulides are quite suf-

ficient to enable the surgeon to avoid mistakes in the majority of instances, when called upon to distinguish an epulis from any other form of growth. When we add to them the distinctive characteristics of the other tumors of the alveolar processes, little opportunity is offered for a mistake in diagnosis.

Some perplexity may arise in distinguishing between an epulis and an epithelioma of the gum. In these cases, if none of the above mentioned characteristics of epulides are decisive, one must depend upon the appearance of the growth. As a rule, the trained eye will rarely be deceived. Even in the earliest stages of epithelioma some indication of an everted, rolled-out character of the border of the growth is present. The tissue of these tumors is also much firmer than that of epulides, and central ulceration appears early. Whenever there is doubt, a small fragment may be removed for microscopical examination. Whenever possible, however, this practice should be omitted, as it, unquestionably, stimulates the tumor to a more rapid growth. If the first observer is in doubt regarding the exact nature of one of these tumors, it is his first duty to call in one who is accustomed to see these conditions. On no account should he incise or in any way molest the growth. Only too frequently have patients lost their lives as a result of such interference. The practice of meddling or temporizing with new growths within the mouth cannot be too strongly condemned.

Although sarcoma occurs at an earlier age than epithelioma, it is less likely to be confused with the epulides as its growth is either from within the bone of the jaw or from the periosteum, causing an even ovoid and smooth bulging of the mucous membrane over it. Such growths present every indication of their deep-seated origin. Much the same is true of the odontoma.

From no standpoint is an appreciation of the true character of epulides more important than from that of treatment. In any form they are to be regarded as essentially curable growths. A complete removal of the tumor will always be followed by a cure. Although strictly speaking they may belong to the group of sarcomata, they are local growths and have never produced metastases in even the regional lymphatics. They are always attached to the periosteum lining the follicle. This periosteum

is embryologically analogous to a ligament—the ligament of the so-called alveolar dental articulation between the tooth and the wall of the follicle. In any case the base of an epulis is attached to this membrane, and the latter must be destroyed where it gives rise to the tumor, in order that a recurrence may be prevented.

Recognizing this fact and the favorable character of the result to be expected when the whole tumor is removed, the usual plan of operation, as advised by such eminent surgeons as Garretson and McBurney, consists of the extraction of one or more teeth on each side of the tumor, and the removal by the chisel of the bone underlying the area enclosed by the incision—in other words, the removal of all the bone of the alveolar process underlying the tumor. It is particularly advised that care should be taken to remove the whole of the follicle, or follicles, invaded by the tumor.

While this procedure will always accomplish a cure, I have found that it is unnecessarily radical. If we were dealing with a tumor which had any claim to malignancy, the loss of a few teeth would not be a matter of consequence. The recurrence of an epulis itself is not, however, a matter of consequence; so that it is permissible to deal with these growths in a far more conservative manner. My own experience demonstrates that a more conservative treatment is not only permissible, but it can be relied upon to yield a cure without danger of recurrence.

The treatment for epulides, which I am about to describe, I have not found in any literature upon the subject; and, as far as I know, is entirely original with myself. I have used it for thirty years with the most gratifying results. The technique consists in the removal of the tumor; then, by means of actual cautery in the destruction of the periosteum and the cells in the superficial layer of the bone beneath the area of the tumor. Curette and treat antiseptically. I have not yet seen a recurrence following this treatment. The advantage of this method of treatment consists in the preservation of teeth and portions of the alveolar process, which are sacrificed by the more radical methods of treatment; while, at the same time, it does not jeopardize the interest of the patient.

PROSTHETIC RESTORATION OF ACQUIRED DEFORMITIES OF THE SUPERIOR MAXILLA¹

BY V. H. KAZANJIAN, D.M.D., DEMONSTRATOR OF PROSTHETIC DENTISTRY, HARVARD DENTAL SCHOOL.

The dentist who is busy with general practice sees very little of those unfortunate cases where the oral tissues are deformed at birth or by operations, disease, or accident; yet the specialists, or those who are connected with the schools and hospitals come into daily contact with them.

These cases need artificial restoration, and fall under two general classifications:

1. Those of congenital origin.
2. Those of acquired origin.

Under congenital cases come cleft palate and hare lip.

Under acquired cases come those due to accident or disease.

It is possible, to a certain degree, to classify congenital deformities, to set out the rules for construction and the uses of certain appliances for their correction, as these cases present more or less uniform conditions. Our literature is well supplied with reference material for the student seeking such information.

However, when we seek to analyze the deformities arising from accident and disease, we find it almost a hopeless task to attempt to classify them, as there are so many variations. No two cases are alike. We may have, for instance, a very simple perforation of the hard or soft palates, or we may see the destruction of the velum, a considerable portion of the palate, the vomer, the turbinated bones, and the greater part of the maxillæ, including the destruction of the nose. We may see severe conditions resulting from extensive operations or from gunshot wounds. We may see part or whole of the maxillæ destroyed.

There is no specialty of dentistry that requires more individual study and that forces the prosthodontist more actively to devise new methods and appliances than these cases of acquired origin.

¹ Read before the American Academy of Dental Science, Boston, Nov. 4, 1914.

In this paper I shall take up only the deformities of the upper jaw, resulting from accident or disease.

Causes of deformities of the upper jaw of acquired origin.

- 1st. Advanced stages of syphilis.
- 2nd. Following operations of malignant tumors.
- 3rd. Tuberculosis.
- 4th. Necrosis caused by extensive inflammation of dental or other origin.
- 5th. Extensive fractures.
- 6th. Gunshot wounds.

By examining a case it is possible to see whether the deformity is of congenital origin, or is the result of accident or disease, as different causes leave certain characteristic marks in the oral cavity.

Deformities due to syphilitic necrosis happen in the tertiary period of the disease, although we have cases of hereditary origin on record. The upper jaw is affected much oftener than the lower one. According to Marshall, "the syphilitic virus has a predilection for the compact tissue of the bone and most often attacks those portions of the bone which have soft thin coverings like those of the skull, the palate process, the palate bones, and the alveolar process. A marked exception to this is necrosis of the spongy bones of the nose following syphilitic ulceration of the nasal mucous membrane."

When it is in the upper jaw very often we see the alveolar and palatal processes affected, together with perforations into the nasal cavity. If the disease is not checked, the destruction of the bones may involve the whole of the hard palate, spread to the nasal bones, and destroy not only these, but also the soft palate, and even the soft tissues of the nose. In the majority of cases the trouble is checked when the perforation is only one-half an inch in diameter. The borders are hard and irregular without any soreness or inflammation. Favorite locations are in the vault of the mouth and the alveolar processes in the labial, or buccal regions (Figs. 1 and 2).

In the more extensive cases we may find two perforations, one in the anterior, the other in the posterior palatal region. (Fig. 3.)

There are cases on record where the vault and alveolar processes are destroyed together with the nasal bones. In these cases the nasal and oral cavities become one, and you can imagine the extent of the deformity and the discomfort of the patient.

Under our second heading—*deformities resulting from operations*—we have the removal of malignant tumors (with carcinoma, the most common). The size of the injury depends on the extent of the tissue removed. In the early stages of cancer there is very little deformity, perhaps a simple perforation of the hard palate on one side of the jaw without apparent deformity of the face (Fig. 5). Yet it is very common to find one-half or two-thirds of the superior maxillary bones removed, and also the soft palate on one side (Figs. 4 and 6). In such a case we see an extensive opening into the nasal cavity. The face on that side is depressed, and there is gross facial deformity. The appearance is entirely different from the condition resulting from syphilis. The opening is not in the middle of the hard palate, but involves one side of the jaw. It covers more area, the margins are smooth, more or less tender and vascular and there is external deformity of the face.

Fractures of the maxillary bones generally cause very little deformity if prompt and careful attention is given. However, one of the worst and most unfortunate conditions in the history of similar cases was due to the fracture of the superior maxillary bones. This case I will present to you later.

As a general rule, a bullet causes fracture of the bones with very extensive destruction of the soft tissues. After the treatment of these cases we very often find the loss of many of the teeth and extensive destruction of the process. At other times the arch of the mouth has a very irregular contraction characteristic of gunshot wounds. If the mandible is involved, it is not uncommon to find part of the body of the bone wholly gone, leaving one ramus free.

All these acquired deformities have no resemblance to congenital cleft palate cases. The latter has a distinct location in the posterior palatine region. The uvula is bifurcated. If the hard palate is affected we find the same uniform tissues on either side of the mouth. There is no destruction of turbinate, nasal and vomer bones, as these are distinctly seen through the mouth.

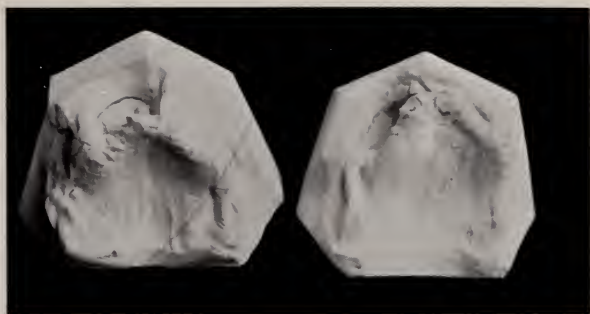


FIG. 1

FIG. 2

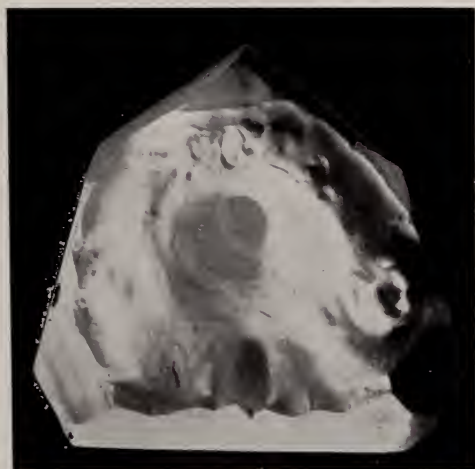


FIG. 3

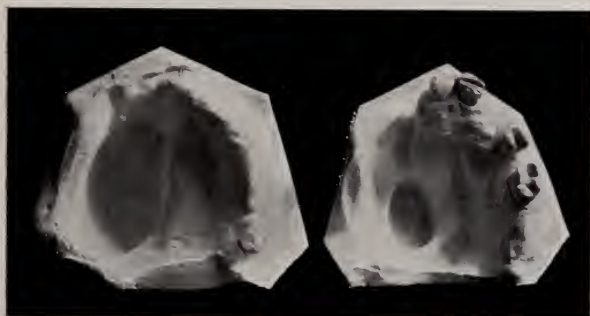


FIG. 4

FIG. 5

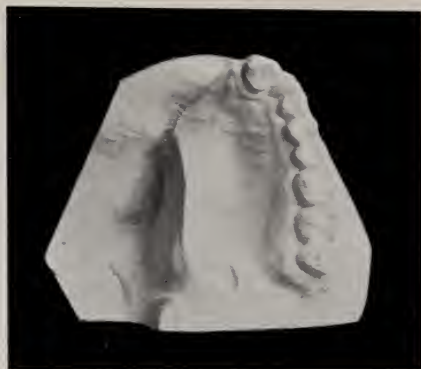


FIG. 6

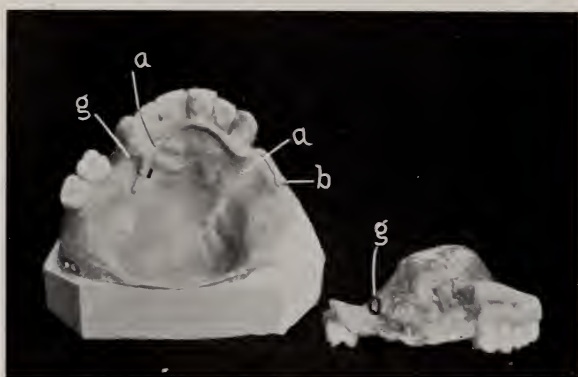


FIG. 7



FIG. 8

The Effects of Such Deformity on the Patient's Condition and Health.

One characteristic of oral deformities of this character is the effect upon the patient's speech. This has a distinct nasal tone. In more severe cases this is so pronounced that it is very hard to understand the patient. This is a very natural consequence when we analyze the function of the oral cavity in articulate speech.

"It is essential to the perfection of human speech that the nasal passage for the outflow of sounds at certain times be completely shut off, and all the sound directed through the mouth. If the palate be deformed we shall find a change in the tone of the voice and more or less indistinctiveness of utterance depending on the extent of the deformity."—*Kingsley*.

In a case of this description, the patient is especially susceptible to infection of the respiratory organs, while the secretions of the nose and different sinuses having free access to the mouth are a further danger to the patient's health. The mucous membrane of the nasal cavity is in a constantly hypertrophied condition. The patient being conscious of his defect is more or less irritable and sensitive, often very backward, shuns society and becomes morose.

His usefulness is limited, and he is handicapped in securing opportunity to earn his livelihood. In one case a man who had lost his nose was refused work and faced starvation.

Plastic surgery can do much toward minimizing the defects in many cases. The literature of surgery has numerous records of very successful operations. When surgery fails, prosthetic restorations are often highly satisfactory. Here also our literature abounds in wonderful and ingenious appliances devised for individual cases.

Requirements for a Successful Restoration.

Simplicity, conformation to the laws of prophylaxis and hygiene, together with comfort, are first essentials in the construction of a restorative appliance.

One very important requirement is that it should not exert any undue pressure on the delicate parts. We must remember that after an operation the tissues are not as healthy as in nor-

mal cases and do not have the same vitality. A very slight irritation, after an operation for malignant tumor, may hasten the recurrence of the dreaded disease and an appliance may become a source of harm.

Appliances.

It would be impossible in a short paper to give you a detailed description of the appliances in use for the correction of the deformities that I have tried to outline. However, I will try to make a general review of them. For the sake of convenience I will describe the appliances for correcting the acquired deformities of the upper jaw under two classification.

1st. Dentulous cases.

2nd. Edentulous cases.

In dentulous cases we have many variations. We may have all the teeth present except for the deformed area, or we may have only a few, together with an extensive loss of tissue. In either case we must calculate the amount of retentive force we have. This is supplied by the teeth remaining in the upper jaw, and the remainder of the hard palate and the alveolar ridge. If we have sufficient resistance for the wear and use of the appliance the question is comparatively simple. We must often borrow from the lower jaw the support necessary to retain the plate. In the latter case the appliance must necessarily be complicated and less comfortable to the patient.

Attachments.

1. One of the simplest means of attachments is the ordinary clasp. The selection and position of the clasp is to be governed by the conditions present.

2. Gilmore attachments, with extension bars give far more suitable anchorage and support. I can illustrate this by a typical case which I will describe later.

The Plate.

The plate should be extensive enough to close the deformed area and support the missing teeth. It is possible to extend the plate into a perforation like a plug, yet too much dependence should not be placed upon this, as it may cause irritation of the surrounding tissues and complications may follow.

Edentulous Cases.

When we are faced by cases where there are no teeth present

in the upper jaw we have more complicated problems to solve.

We may subdivide the edentulous cases into two general classes.

1. Simple perforation in the palatal region or at the process.
2. Extensive destruction of the upper maxilla.

In the first case (simple perforation), as a rule, the forces utilized are (a) *the adhesion of the plate* to the roof of the mouth. (b) *Atmospheric pressure* using vacuum chamber or chambers in the suitable places, (c) friction by extending plugs through the perforation.

These are especially indicated when the opening is small and is due to syphilitic necrosis. The tissues surrounding the perforation are healthy and hard, and can stand considerable pressure. If the perforation is due to cancer and the resulting surgical operation we have to be more careful, as any extension through the perforation may not be tolerated.

In extensive destruction of the maxillary bones with the teeth absent we have a very hard problem, the means of attachment described thus far not being applicable.

Here the support is obtained from the lower jaw, using spring attachments, of which there are three kinds: spiral springs, perpendicular springs, horizontal springs.

The use of *spiral springs* is very old. I could not verify the authorship of this means of attachment, as almost all our authorities have made use of it. In fact, it was the common method for gaining retention in upper and lower plates where no deformity existed at all. Now with an increased knowledge and better technique we secure retention by other means. The spiral springs were of gold, about two inches long and one-eighth of an inch in diameter. One end was hinged to the lower plate, and the other to the upper at the second bicuspid region on the buccal side. As the mandible was opened and closed the lateral force of the spring forced the plate into position. In my judgment it was very unsatisfactory, yet it has been useful in many cases.

The *perpendicular springs* are made on the same principal as spring mouth props. Hollows are made on the upper and lower plates at the first or second molar region to receive the perpendicular spring, which is approximately one-fourth of an inch in diameter.

These have some very serious disadvantages. They limit the mandible to up and down motions which are contrary to the natural movement. These springs can only be used in very favorable cases, as they do not work except when in an absolutely perpendicular position.

Horizontal Springs.

As an improvement on these two classes, I have made use of an attachment which I call a horizontal spring attached to a lever. This I will describe in detail in a case description.

Before closing my paper I would like to present to you two appliances, the first a typical case for class 1—*i. e.*, where some teeth are present, and the second case, not only *edentulous*, but with the upper maxillary bones removed.

Case I.—The patient, a woman past fifty, was operated on for carcinoma. On the left side the teeth posterior to cuspid portion of the maxilla were removed. The antrum was involved, though not extensively. After the operation the tissue healed nicely, but the margins of the wound were very tender and obviously would not stand the pressure necessary to support a plate, so I devised some other means of support and retention. To this end I devitalized the cuspids and left central. To them, by means of posts and swedged backs, I attached a 12 g. clasp metal wire extending over the palatal portion of the ridge on the right side, and the missing portion on the left side (Fig. 7 aa). The extension on the left was rounded and terminated in a ball (Fig. 7 b). It fitted into a box on the buccal (Fig. 8 a) surface of the plate, which was locked in position by a Gilmore attachment on the right (Fig. 7 gg).

This appliance has been in use for months, and is giving the patient excellent satisfaction.

Case II.—I wish now to present to you the description of an edentulous case. The patient nineteen years old, six feet tall, weight 154 pounds—a fine physical specimen, while at work on the American battleship *Florida* was severely injured by a broken ammunition hoist. Naval surgeons tell me that the injury was so extensive that they did not expect him to live. Besides external injuries to the tissues of the face, he had an extensive fracture of the superior maxilla. He was unconscious for several



FIG. 9



FIG. 10



FIG. 11



FIG. 12

days. All the ingenuity of the surgeons failed to hold the broken parts in position. After four different operations they were obliged to remove all the necrosed bone, which included the upper maxilla and part of the nasal tissue. The patient recovered after a long, tedious illness (Fig. 9). I have here the two large pieces of bone that were removed (Fig. 10). There were several smaller fragments besides.

As a general rule, a blow sufficiently hard to break the superior maxillary bones invades the cranial bones, owing to their close attachment, yet in this case we do not find such a condition, or if the cranial bones were injured, the almost superhuman resistance of the patient saved him.

Commonly, when we have a fracture of the upper jaw the lower is fractured also, yet in this case it was not affected, nor was there any noticeable injury to the lower teeth.

On presenting himself for dental service, the patient had every appearance of one who is slowly starving, a natural result of not being able to eat solid food for months. His weight had dropped to 110 pounds, his speech was unintelligible, the tip of the nose was depressed, as were his upper lip and cheeks. Scar tissue formed in the mouth accentuated the naso-labial fold. All these combined to give the patient a very unattractive appearance quite in contrast with former times.

Examination of his mouth showed all his lower teeth present except one molar on the left side, lost before the accident, and his lower third molars unerupted. There was practically no roof to the mouth, nasal cavity and oral cavity being practically the same. The mucous membrane covering the turbinate bones was inflamed, that being nature's effort to close the unnatural opening. The soft palate was present. The perforation was surrounded with hard scar tissue. The photograph explains the condition of the mouth (Fig. 11).

After seeing the patient, carefully examining the mouth and making models (Fig. 12 a), I naturally looked up the dental literature for some aid, and found records of a number of very interesting cases and very many ingenious appliances, but there was not a case where the dentist dealt with an entire loss of the maxillary bones, there almost always being parts of the process and some teeth present as a foundation.

In this case the absence of both the teeth and the superior maxillary bones left an opening of about the size of a silver fifty-cent piece to the nasal cavity, surrounded with soft and scar tissue.

Three problems had to be solved before I could expect any success—namely, *the retention* and *the stability of the plate*, and *the resistance* to the force of mastication.

Therefore in describing the appliance I shall follow the same order.

1. *How retention was acquired.*

It is needless to say that one could not have retained this plate by means of adhesion or by friction, using plug-like extensions to the nasal cavity. Accordingly, the only other alternative was the use of springs attached to the lower jaw.

The Spring Attachment.

The lower bicuspid and molars were crowned and fastened together. Heavy buttons projected buccally from the first bicuspid and last molars (Fig. 13 aa).

The spring attachment consisted of a lever and a *horizontal spring* (Fig. 13). The latter was attached to the anterior button at one end, and the other carried the short arm of the lever. The posterior button acted as a fulcrum, while the other arm moved in a buccal, gold-lined groove made on the plate (see Fig. 13 b). This groove was made more or less circular in shape, and slanted downward and backward at an angle of about 45 degrees.

The spring was made of platinized gold wire, 26-gauge, and the completed spring was one-eighth of an inch in diameter. It was in constant tension and the force could be increased or decreased, according to the demands. It was easily adjusted and removed. This simple attachment has proved to be far superior to spiral springs.

2. *Stability of the plate.*

While the springs were able to support the plate, yet they would not give sufficient stability. This was secured by means of small extensions into the nasal cavity and above the soft palate toward the pharynx (Fig. 12 c). These extensions gave lateral support. The teeth were set with a pronounced overbite that, combined with two *inclined planes* posterior to the last molars, governed the occlusion when the upper and lower teeth came to-

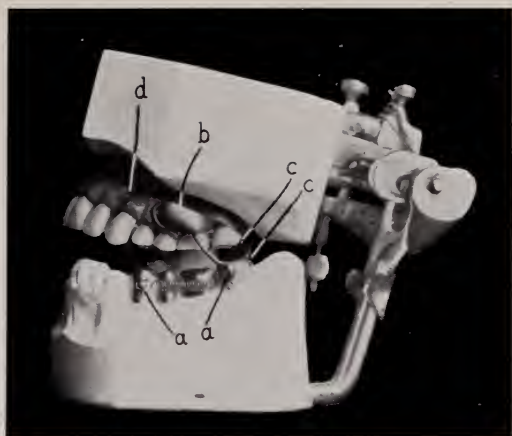


FIG. 13



FIG. 14



FIG. 15



FIG. 16

gether (Fig. 13 cc and Fig. 14 cc). See appliance in position, Fig. 15.

3. *Resistance.*

The next step was to find the *resistance* necessary for the forces of mastication. Normally, the palatal portion of the superior maxilla furnishes sufficient resistance to support the plate during mastication, but in this case the entire palate was gone, leaving soft and scar tissue, so that it was necessary to seek some other support.

After trying various devices in the mouth, I decided that I would have to get my force from the outside of the mouth. To accomplish this result, two horizontal tubes were placed in the plate at the cuspid region extending antero-posteriorly (Fig. 13 d). In these tubes were fitted 8-gauge wire, bent to leave at the corners of the mouth, go up by the base of the nose to a saddle over the frontal eminence and part of the forehead (Fig. 12 b and Fig. 16).

This frontal support was held and pressed close to the tissue by a pair of heavy eyeglasses. This appliance is worn only when the patient is eating, carrying the force of mastication to the frontal eminence. It is made of elastic rubber and lined with pink rubber. When this frontal support is worn the springs are either clamped in the mouth or taken out, as the patient can masticate better without them.

The patient is able to chew his food very comfortably. One would think that the skin on the frontal region would not tolerate any pressure, yet there is no evidence of inflammation so far.

The whole appliance can be removed from the mouth very easily and put back again. Even the gold crowns on the lower teeth are set in gutta percha, so that in case of emergency they can be removed very easily.

It is now over eight months since the patient first had the use of the appliance. His speech has improved wonderfully, and he gained his normal weight in two months. There is no evidence of abrasion or inflammation in the mouth due to the plate. His third molars are beginning to erupt. I have made allowances for them, so that they will be taken care of when they are fully erupted.

GOLD INLAYS VERSUS AMALGAM FILLINGS¹

BY HENRY W. GILLET, D.M.D., NEW YORK CITY

The reason for the presentation of this paper is an article in the September number of *The Journal of the Allied Dental Societies*, entitled "The Use of Amalgam Fillings vs. Gold Inlays in Broken Down Molars," by Dr. H. L. Wheeler.

The general purport of the article is to urge the claims of amalgam as the best filling material that we have, and many reasons are advanced in evidence of its superiority over gold inlays for the restoration of lost tooth tissue.

If the claims and statements of the essayist are correct, then those members of the profession, who have been using the gold inlay, are entirely wrong in their conclusions as to its usefulness, and, as conscientious practitioners, they must at once change their practice, discarding the gold inlay wherever possible, and substitute amalgam for it in their routine practice.

I deem this section, composed as it is of men especially interested in inlay work, to be the right place for discussing the problem the essayist has raised. I desire, first, to state the reasons why I feel qualified to express an opinion on the question. In brief they are as follows: In the earlier years of my practice, it was such that my patients' best interests were served by a fairly generous use of amalgam. I antedate the essayist in practice by four or five years, and during the first ten years, at least, of my practice, I was striving very diligently to make just such amalgam fillings as he describes as his ideal, except that my knowledge, in common with that of every other practitioner, of that date, did not include an intelligent appreciation of the possibilities of amalgam in the restoration of occlusal shape. As my practice broadened, it included more patients for whom gold fillings were feasible, and for whom such fillings seemed to me the best service I could render them.

Up to the time of the advent of the two-piece, or matrix, gold inlay, I strove very diligently to make the best type of

¹ Read before the Section on Crown and Bridge and Inlay Work, First District Dental Society, S. N. Y., Dec. 16, 1914.

amalgam filling, and the best type of foil filling for the places where my judgment indicated them to be best suited. Since that time, I have striven with the same earnestness to deliver to my patients what I believe to be better service with the gold inlay, not, however, to the exclusion of any one of the accepted standard filling materials. I feel that this experience, extending over thirty years, warrants me in expressing an opinion on the question under consideration.

Before taking up the claims of the essayist, I desire to define my position on certain points. In the paper referred to, it seemed, all the way through, as if its author was comparing the best kind of amalgam work with very mediocre inlay work. In my remarks I desire to avoid either this position, or its opposite, and to speak only of the best type of work of either kind.

In speaking of inlays, or restorations, I shall have in mind inlays which reproduce the form of teeth as nearly normal to the case in hand as is feasible, both with regard to contour and occlusal surface, and that fit the cavity margin, or the immediately adjacent enamel surface, with such accuracy as to leave no cement line visible, and no overhanging margins in evidence.

I shall have in mind amalgam fillings, or restorations with the same characteristics, in so far as the material lends itself to their production, fillings where the preparation of the cavity has been in harmony with the best accepted principles, where forethought has been taken for so locating and so shaping the margins as shall protect both enamel and filling margins from stress in so far as may be feasible.

In speaking of gold inlays, or restorations, where not otherwise specified, I shall have in mind the product made by the so-called indirect system, where an impression has been taken of the cavity, and a duplicate, or die, made in amalgam.

There appeared in the paper in question a somewhat lightly veiled hint that the advocates of gold work were influenced in this advocacy by their own financial interests. This is, of course, a charge that every right thinking professional man will immediately repudiate, and I do not feel that there is reason for even the delicate handling of the subject in evidence in the paper we are discussing. If we were discussing those disfigur-

ing gold shell crowns, which some seem to delight in placing on the front teeth of their patients, I should be ready to admit that the operator was probably considering his own financial gains rather than the welfare of his patients. As a matter of fact, I much more often see examples of what seem to me disregard of the patients' interests in order to further those of the operator, in the recommendation of the simple, the cheap, and the easy for the sake of standing well in the opinion of the patient rather than for the advancement of his highest interests.

I am unable to see that this form of yielding to self-interest is any less reprehensible than the kind that seems to have occupied the mind of the essayist.

It is not only my habit to use the indirect system in the production of nearly all the inlays which go through my hands, but it is my belief that in this way I do my patients greater service, and do it more easily for myself than would be the case if I were to use the direct system.

It will not be out of place in this discussion to state my reasons for this belief. The chief reason for my choice has to do with the amalgam die, and the fact that such die, or duplicate, of the cavity is readily obtainable at the second transfer from the cavity, and that this die serves as a substitute for the cavity in all further work, enabling the operator to correct such deficiencies and errors in the subsequent steps as it is important to have corrected.

I hold that the statement of the advocates of the direct process that the indirect introduces more chance of error, is based upon mistaken premises. I believe that the process of taking an impression of the cavity in a suitable modeling compound, is as little subject to error as is the step of forming the wax core in the cavity, and that the making of the amalgam die is *less* subject to error, than almost any other step in either inlay process.

If these claims be well founded, then we have, in case of accurate work, a die which is very close indeed to being a true replica of the cavity. When we have such a replica but two steps from the cavity on which the procedures needed for correcting subsequent errors may be carried out, it seems to me self-evi-

dent that the operator is in a more advantageous position for carrying them out than he is when they must be done on the tooth itself. Especially do I feel this to be the case when, as is my own custom, the operator desires to use a gold that is harder than 24-K gold, and which is, therefore, more difficult to manipulate in making the required corrections. I believe that all castings, regardless of the process used, or the skill of the operator, require some of these corrections, and that the man who talks about reproducing *absolutely* his wax core, or about getting an *absolute* fit of the cavity, is talking a manifest absurdity.

Most of my other reasons for preferring the indirect system are convenience factors, and do not properly belong in this discussion. There is, however, one, which has a bearing on the paper under consideration. It is claimed by some advocates of the direct system, that the indirect system always results in a product smaller than the cavity. This I can neither affirm nor deny. I can only express the hope that it is a correct statement because I believe it to be a distinct advantage. My reason is, that this fact, if it be a fact, interferes in no way with the effective anchoring of the inlay. Assuming correct cavity formation, this slight reduction in size will not unfavorably affect the anchorage of the inlay in such a manner as to make possible its dislodgement by stress in any other direction than the one opposite to that from which it was inserted, nor can it, with an accurate amalgam replica of the cavity at hand, introduce any real difficulty in the way of establishing a close fit of the margin.

These two essential points having been provided for, it would then be my choice to have a liberal layer of cement between the gold and the cavity wall. I prefer to regard my gold inlays as tight stoppers covering cement fillings.

I feel that it is the aim of the present day practitioner to do something more than preserve the tooth from decay, or even to restore its proximal contour. It is necessary, in order to live up to the standards of to-day, that wherever possible the efficiency of a broken down molar or bicuspid, as a masticator, shall be restored. I feel that but few operators will dispute the dictum that the two materials, which we use as fillings, with which this end can best and most readily be accomplished, are

the gold inlay and amalgam. A few may hold that porcelain restorations need to be mentioned, and the value of the gold crown is not to be forgotten, but the limitation I made above seems to exclude both of them from first rank.

Of course, it is patent to all of you that when I speak of restoring the efficiency of a broken down molar, I include the reproduction of its occlusal surface along lines normal to the conditions of the mouth in which it stands. This practically excludes the foil filling from consideration in any such case.

This general preface brings us to the point of direct comparison, which the essayist in question has made between amalgam fillings and gold inlays, greatly to the disparagement of the latter. I have the feeling that within the limitations named in the title of his paper—viz., "Broken Down Molars," a word needs to be said concerning the physical differences between the two materials before we proceed.

You will understand that in speaking of these differences, I have in mind an alloyed gold, preferably an alloy composed of 24-K gold, and pure platinum, in percentages that may vary from 2½ to 10 per cent. of platinum, according to the requirements of a given case.

For many cases in which restoration of broken down molars is required, I would feel it just as logical to claim superiority for an amalgam restoration over a restoration of alloyed gold as to claim superiority for cast iron for some use where the tenacity of wrought iron, or soft steel, is recognized by the mechanic as a needful quality.

I grant that in a reasonable proportion of cases all margins of such restorations may be so placed that the brittleness of amalgam will not be especially detrimental, but even in the most favorable cases it seems to me that the most that can be said for amalgam on this score is that it can be made to serve the purpose.

With what I apprehend to be the central idea of the essayist in the paper in question, I am not disposed to disagree. As I re-read the paper I am impressed with the thought that in stating that central idea, he first overstated it, and then felt it necessary to find arguments to support that overstatement, and

it is chiefly with his supporting arguments, or reasons, that I radically disagree. Indeed, if we take the final paragraph of his paper, and eliminate from it a single clause, I would accept it as a correct statement. He says:

The only thing that I shall hope to have suggested to you in this short paper is that, intelligently used, conscientiously shaped and fashioned, amalgam will produce as useful and satisfactory a means for the reproduction of lost parts of decayed teeth as any substance I know; and the man who uses it need not apologize to his patients for his work at any time. He may rest assured that his services to his patients are equal or superior to those of many who make great claims now, as of old, concerning the superiority of gold; and he need have no compunction about charging the patient such fees as he may feel that his time and skill are worthy of.

If, from these sentences, we eliminate the clause:

He may rest assured that his services to his patients are equal or superior to those of many who make great claims now, as of old, concerning the superiority of gold.

and add the balance to his first sentence, we have a statement to which most of us will subscribe.

Earlier in the paper he had stated the advantages to be considered in utilizing amalgam in large restorations in the following words:

I maintain that it is not only superior in most cases to gold inlays, but far and away to gold caps; in fact, my feeling about gold caps is so strong (while I realize their utility in certain places and upon certain occasions when used intelligently) that I am prepared to state it as my firm belief that if gold caps had never been known up to the present time, the welfare of the human teeth would have been advanced.

The reference to gold caps, we do not need to take up in this discussion beyond noting the fact that the present day gold crown, accepted by reliable operators, is not of the type he has described; but the claim of superiority for amalgam over the gold inlay does need consideration, for the reason I stated earlier in the paper—viz., that if his claims and statements be true, then the profession must promptly discard the inlay in at least nine-tenths of the cases for which they are now using it.

The consideration of his claims necessary in order to reach a conclusion as to whether it is incumbent upon us to so discard the gold inlay, I desire to take up in detail, quoting each

one, and commenting or replying to it in the sentence immediately following the quotation.

After speaking of the cavity shape necessary for the proper placement of a gold inlay, referring particularly to the need for parallel walls, he states:

The result of this hard and fast necessity in the preparation of cavities for inlays, often means the cutting away of cavity walls and enamel prisms to an extent that very much weakens the tooth, and probably will result in the gold being considerably different shape and contour than the original enamel of the tooth.

My reply to this is that in my hands there would be little if any, difference in the preparation of a broken down molar for a gold restoration, or an amalgam restoration. There would be as many instances in which there would be more cutting for amalgam restorations as there would be for gold. I should depend for anchorage for an amalgam restoration on pins set in the root canals, and on a broad flat base, and, in case of a buccal surface to be protected, I should feel it necessary to cut it back farther for an amalgam than for a gold restoration, because of the brittle quality of amalgam.

He states:

Another undesirable feature is the necessity for doing a great deal of cutting with a bur. This immense amount of cutting is very painful and very trying to many people.

I feel that this is a statement of personal habit in making such preparations, and that in stating it, the essayist should have said that he personally found it necessary to do such cutting with the bur. I believe he will find many operators who use hand instruments for developing the lines needed for such anchorage as we are considering, and that when the use of such instruments is intelligently supplemented by suitable carborundum stones, the process need not be so severe as he has pictured it.

Next he recites the pitfalls in the mechanical process of making a gold inlay in a manner to suggest that they are exceedingly difficult to avoid, and leads up to this question in which he says:

Granting perfection up to and including the casting of the gold inlay, can you set a gold inlay, or any other kind, without having a thin film of cement between your inlay and the wall of the cavity?

Of course, the categorical answer to his question is that the film of cement is an essential to the inlay process.

A few sentences further on he says:

I believe the use of an oxyphosphate cement in a deep-seated cavity to be more likely to cause pulp destruction than amalgam. At least this has been my experience in a practice of twenty-four years, during which I have been a somewhat careful observer.

We have here a statement of belief, and a theory for which certain proof or disproof is not easily possible. It is, however, an accepted theory that positive evidence is better than negative evidence, and in opposition to the belief of the essayist, I set up an equally fixed belief that the opposite is true, and I base this belief on thirty years' experience in the placing of cement linings under all metallic fillings when there was room for them. I add to the above statement the opinion that the existence of the theory of injury to pulps from oxyphosphate cement is due to the habit of many operators in the past, and I fear even in the present day of leaving decalcified dentin in the bottom of many cavities. Just as long as that habit continues we shall have with us, in my estimation, the theory he has stated.

After referring to the economic side of the question, which is a point I will take up a little later, he states:

In the first place, my experience has led me to the conclusion that in a majority of instances of large cavities in teeth—incisors, bicuspid or molars—the decay extends in such a manner as to make it possible to obtain parallel walls in every direction only at the expense of much good and strong tooth structure; and I again wish to reiterate my faith in nature's ability to produce a material in the making of teeth in the animal economy that is far superior to any substitute that man has, or ever will be able to produce. For this reason, it is my belief that the best interest of my patients is more intelligently served by me when I preserve as much tooth structure as possible for future usefulness than it is when I destroy tooth structure in order to utilize a material which fancy, and not facts, has ever tried to claim to be superior, as a filling material, to anything else that can be used.

I make this quotation chiefly for the sake of pointing out that the essayist's perfectly true statement concerning the superiority of tooth structure to filling material applies to the physiological condition, and when we have introduced the pathological condition of a broken down, or largely decayed molar, there

supervene other questions of greater importance than the preservation of any part of the crown of a tooth for future usefulness.

I refer to the need for certain restoration of efficiency of the tooth involved, and for certain protection of its most valuable element—viz., its root. If, in order to attain effective results in these two points, it is necessary to remove any portion, or all, of the crown, then I regard it as the operator's duty to do so.

The practitioner who has, in the past, delighted to call himself conservative, because he has preserved thin walls and weakened cusps, to break down later, and perhaps carry away with them sections of the all-important tooth root, or who has kept in the mouth of his patients, organs long past the stage of usefulness, and far advanced in their possibilities for harm, because it pleased his patients, has much to answer for.

If the gold inlay had done nothing more for us than to relieve us of the need for over-consideration of weak walls and undermined cusps, because of the time required to place an efficient substitute for them, it would have won a worthy place in our equipment.

In citing the advantages of amalgam fillings, the essayist reiterates the claim that less destruction of sound tooth tissue is necessary. To this I have already replied as concerns the broken down molar. I am ready to admit that in a certain type of cavity not yet advanced to the stage where I would use "broken down" to describe it, it may be desirable to remove a little more tooth tissue in straightening the lateral margins of the cavity. This I have come to regard as an advantage rather than a disadvantage to the tooth. So we have on this point a difference of opinion.

He again refers to the greater use of the hand instrument in the case of an amalgam filling, which I do not admit, and I desire to call to your attention a set of chisels which I use for developing the straight lines in such cases.

He claims

Amalgam can be polished and its edges made perfect (if the work has been done properly up to this point) much more readily and with greater comfort to the patient than can be done with gold, either as inlays or the old fashioned foil filling.

So far as this applies to the gold inlay, it is an obvious misstatement, if the indirect system is followed, since the polishing of the inlay should all be done at the bench, except such slight polishing as may be needed to remove the burnisher marks resulting from the final perfecting of its margins.

He claims greater conspicuousness for the gold inlay over the amalgam filling, apparently forgetting the color modification due to alloyed gold in an inlay, and the possibilities in the use of small enamel inserts fused into the inlays as the points of high lights. With these aids I feel that there can be no question about the shadow and staining effects of the amalgam, making it more objectionable.

He states of amalgam:

It is more certain to go exactly where it is placed, with no danger of its drawing away if properly placed, and leaving a crevice for the accumulation of bacteria.

I fail to see that this claim can be supported. His claim that amalgam "can be more artistically shaped and carved with less wear and tear on the patient" is certainly incorrect. When the indirect system is followed in inlay work there is no wear and tear while the shaping and carving goes on at the bench.

The claim that amalgam work means shorter sittings is true, or not, according to the habit of the operator and the size of the filling. If the patient is one needing especial consideration, inlay work may be done with as short sittings as can amalgam.

I challenge the correctness of the statement that proper occlusal surfaces can be more readily produced, and smooth margins can be more readily obtained with amalgam than with the gold inlay. It seems to me too obvious to need argument that the inlay system gives marked advantages at both these points.

We now come to a statement, which surprises me very much. from any man in successful present day practice. The essayist says:

In case of trouble with the pulp at a future time it is much easier to enter the pulp chamber directly through an amalgam filling than it is when gold has been used.

I had supposed it common practice by all operators when placing gold inlays sufficiently large to admit of it, to form on

the cavity side of the inlay, a recess in proportion to its size, to fill this recess with gutta percha, and in the case of large inlays, to take forethought for the placing of that recess so as to include the probable line of access to the pulp in case of need. If it is not common practice to so proceed, then, in my opinion, it should immediately become so. Surely no one will claim that it is more difficult to reach a pulp through such an inlay than through a solid amalgam filling. The whole treatment and root filling may reasonably be conducted through such an opening in a large inlay without unseating it. The opening may then be closed by a second inlay, so re-establishing the original conditions.

The claim that it is easier to repair an amalgam filling than a gold inlay, needs something more than dogmatic statement to support it. The following is quoted:

I still maintain, as I have for many years, that the chief aim of a dentist who is, in any sense, a professional man, is to give his patients the greatest comfort and utility, with the least trouble and expense to them that is possible; and I believe that this consideration should outweigh the question of some particular kind or type of filling which the fad or fancy of the hour dictates as the proper thing; and because I believe this, and because of my experience of over twenty years, I am still convinced that a plastic filling with as many good qualities as our modern amalgams, will give greater satisfaction in most locations in the mouth, and look as well where a strong, direct light does not reach it, as any other material that it has yet been my privilege to use.

Here we have the real summing up of the essayist's position, and in some respects it is admirable, but it is my contention that it is too sweeping. I can see no reason why the person desiring the very best in any line, and having the funds, which he is willing to part with in exchange, should be denied the right to have it, and I contend that the essayist has failed to make good his claim that amalgam *does* provide the best that the present day dentist can do in the restoration of lost tooth tissue in broken down molars.

It is patent to most of us, who have had experience with gold inlays and with amalgam, that a more efficient occlusal surface can be developed with the gold inlay than is possible with amalgam, and I believe it to be equally plain to those who have

had wide experience with both materials, that the inlay is the better and more efficient protector of the integrity of the all-important root of such a broken down molar than is the amalgam restoration.

I am quite ready to accept amalgam as still having a very important place in our procedures. I consider it as standing second only to gold inlays in its efficiency, and that it will so continue. Further than this, it would undoubtedly be a greater loss to our profession and to our clientele to be deprived of amalgam than it would to be deprived of gold inlays. More dentists, and many more of their patients would be inconvenienced by its loss.

I removed, within a year, just such a restoration of the whole occlusal surface of a broken down molar as the essayist has described, which I made twenty-five years ago, and I have in preparation to-day a tooth in which I expect to make such a restoration. The reason for the first one was that we had nothing better at that time. To-day for that same patient I should use a gold inlay restoration retained by pins in the root canals, and I believe I could, if given the opportunity, make that same tooth do longer service with no greater expenditure of time and energy on my part or the patient's, by using such a restoration.

For the case now in hand, I am using amalgam because the patient prefers not to incur the additional expense, and makes his choice with an intelligent understanding of the difference in result.

After repeated readings of the statements of the essay we are discussing, I am confirmed in my feeling that its conclusions are based upon insufficient experience with inlay work, and upon a lack of knowledge of the best practice in that work, and that the essayist has failed to make out his case.

BRIDGE WORK RESTORATIONS WITHOUT EXTENSIVE CUTTING AND MUTILATION OF TOOTH STRUCTURE¹

BY FORRY R. GETZ, D.D.S., NEW YORK CITY.

I have taken as the subject of a short paper, the treatment of a practical case which I completed two and a half years ago, and with a preliminary word or two, will present briefly the conditions of the case and its treatment. I shall feel repaid if your interest equals only a part of the measure of satisfaction which the results have afforded to the patient and myself.

I have taken this because it is one of the best concrete examples that I could wish for, to present with emphasis what I personally hold to be of prime importance in the crown and bridge division of prosthetic dentistry—namely, that in the treatment of cases needing restorations and replacements, the work must be done with the utmost care and consideration of the conditions already existing to insure the largest degree of ultimate good for the patient.

That means simply, that in making restorations in a given set of conditions and with a definite end to be attained, in which shall be embodied the largest number of desirable results, only such form of appliance and attachments should be made use of as will involve the least interference with the normal state of the teeth and gums, and yet be readily modified and adapted to future needs.

This is a matter which cannot be decided in an abstract and theoretical way, because of the endless number of conditions and combinations that are possible and that make crown-work and bridges necessary. You must have the case and its factors immediately before you—and in the instances, where extensive work is needed, an accurate set of models of the mouth for study should first be made, in order to consider the case from every side and to determine the measures suited to the needs.

In all the branches of dentistry to-day there is not one that

¹ Read before the First District Dental Society of New York, December 7, 1914.



Fig. 1. Palatal view of temporary appliance in place



Fig. 2 (a). Right side of arch without permanent appliance



Fig. 2 (b). Front view of same



Fig. 2 (c). Left view of same

requires more thought and care and more individual skill, experience and good judgment than crown and bridge work. There are older men who have known that, and also possessed the skill to put their conceptions into practical form. They worked along those lines for years, and to them we owe a very great deal. A larger proportion of the profession is coming to realize the importance of studying the individual cases in this branch of our work, and to see that there is perhaps also an ethical principle involved.

The case shown by the models was taken up, and work begun upon it, after the orthodontist had done all that was possible and advisable in bringing the teeth that were present into better positions. The age of the patient was twenty-four, and the conditions of the teeth of the upper arch at that time were briefly as follows:

Incisors retruding;

Laterals missing—were never present;

Canines retruding; mal-formed and pointed;

First Bicuspid on right side, small, rotated distally with buccal cusp toward molar and 1.5 m.m. distant from canine.

First Bicuspid on left side, small, occluding only on buccal cusp, and 1.5 m.m. distant from canine.

Second Bicuspids on both right and left sides missing, were never present.

First Molar on right side was inclined forward, and lacking in occlusion by about 3 m.m., except slight contact on the distal cusp.

Second Molar on right side occluded fairly well.

Third Molar on right side was impacted.

First Molar on left side, missing—was never present.

Second Molar on left side, missing—was never present.

Third Molar on left side in position of first molar, inclined forward, rotated mesially with buccal cusp toward bicuspid, and lacking in occlusion by about 3 m.m., except on distal side.

There was one small occlusal filling necessary, but no other decay or fillings.

The patient was wearing open-face platinum crowns on the canines with bar carrying the lateral facings, which had to be

removed to prosecute the work, but the patient would not wear a temporary plate in their place. It was necessary, therefore, to construct a temporary appliance that was small in bulk and readily removable for fitting the permanent appliance. This was done by making two close-fitting open-face crowns of platinum, split on the distal side and drawn together by tension screws, for the bicuspid, and attaching a post-incisor palatal bar to them; from which extensions were carried forward for the lateral facings.

The permanent treatment of the case presented difficulties, because the appliance had to serve both as bridge to supply the missing teeth and occlusion, and as retainer for the teeth loosened by regulation. Any form of fixed bridge-work was ruled out as detrimental and a menace for a number of reasons and after considerable study, a removable or detachable bridge with clasp attachments was decided upon as best suited to meet all the conditions, as well as being the most conservative of the teeth and gum tissues.

For the sake of appearance, it was necessary to sacrifice the right bicuspid, which was devitalized and cut off at the gingival line and covered with a protective gold cap.

A post-incisor palatal bar of platinum and clasp metal with extensions forward for the lateral facings was constructed to lie close to the palate and gum ridges; the surfaces of the molars not in occlusion were supplied with gold castings on platinum next to the occlusal surfaces, and clasps of half-round clasp metal were closely fitted to the palatal and buccal surfaces of the molars and all the parts assembled by soldering. Slender half-clasps were fitted over the canines close to the gingiva, but on the enamel. Occlusion on the bicuspid on the left side was also raised with a gold on platinum casting.

Thus with two clasps and the bearing surfaces raising the molar and bicuspid occlusions, and with a half-clasp on each of the canines, it was possible to construct a bridge, supplying occlusion for five important masticating teeth and carrying five porcelain facings, without so much as marring the enamel surface of more than one tooth, the rotated bicuspid before mentioned, and the appliance has been in most satisfactory service for the period mentioned.



Fig. 3 (a). Right view of appliance, in place



Fig. 3 (b). Front view of the same



Fig. 3 (c). Left view



Fig. 4. Occlusal aspect of permanent appliance

At the time when two of these models were made, they were intended as records of the case, and with no thought that they would be used for illustration—a fact which is stated not apologetically, but as pertinent.

There is no lower model; it was broken, unfortunately, beyond presentable repair, and the opportunity and time to make a second did not combine. The lower teeth also were small and mal-formed, but the most remarkable thing about them is the retention in their places of the two tiny temporary or deciduous central incisor roots, and the absence of the permanent incisors as shown by radiograph. The enamel of these two small centrals was disintegrated and chalky, so they were trimmed down to the thickness of ordinary pencil leads and covered with platinum and porcelain jacket crowns joined by a bar.

EXAMINATION OF THE MOUTH¹

BY OSCAR J. CHASE, JR., D.D.S., NEW YORK CITY.

What examination of the mouth usually suggests, is simply looking for cavities; and that appears to be the purpose many of us have in view when the new patient presents himself for treatment. Of course, we all know this is an essential part of our work; however, in our present age of dental enlightenment we must do much more. The responsibilities of our profession having grown far beyond that one kind of simple duty.

At nearly every meeting of this Society for the past year or more, thinking men, the men whose accomplishments in dentistry compel our admiration, have preached against mouth infections and their relation to systemic diseases. Our own JOURNAL, as well as all the leading dental periodicals, is devoting much of its space to this important part of our work. In fact, in the June issue of the JOURNAL OF THE ALLIED DENTAL SOCIETIES, there appeared no less than three articles on the importance and menace of mouth infection.

Dr. Thomas B. Hartzell's paper, entitled "Secondary Infections Having Their Primary Origin in the Oral Cavity" and "Oral Infection in Its Relation to Systemic Disease," by Joseph Head, are both intensely interesting articles and contain many startling facts.

Some time ago, the eminent surgeon, Dr. Mayo, was quoted as having said: "It is evident that the next step in medical progress in the line of preventive medicine should be made by the dentists. *The question is will they do it?*"

How then are we to go about this important task which is expected of us? We know from our daily practice, that not nearly enough attention has been given the *apparently innocent* "gum boil." Application of aconite and iodine is often the extent of the treatment given that condition. And as the patient suffered no pain or annoyance the abscess was considered of no importance.

Our first duty, I believe, and the most important step for

¹ Read before the First District Dental Society, S. N. Y., December 7, 1914.

us to take, when a new patient presents himself is a thorough examination of the mouth—an examination which will include everything; and this is what I wish to present to you to-night—a method, a sort of systematized examination, which will take up in consecutive order the conditions of the mouth in the order of their relative importance. When the examination has been completed we will know far more than the mere fact of how many fillings are to be made in that mouth.

While perhaps I am not presenting anything new to you, or to many of you, this method which I have adopted has proved to me very satisfactory in results.

Without giving any attention at first to the exploration of the teeth for decay, or to cleaning and then exploring as is the usual routine, I first examine for abscessed conditions, fistulas, teeth discharging pus from their sockets, dead teeth, which apparently have not received proper root treatment, or for anything that may suggest mouth infection. We are all from our early training accustomed to looking for cavities; we won't forget them; but we may forget to look for the small gum boil, giving no pain or discomfort to the patient, perhaps situated high up on the labial or buccal surface near the folds of the cheeks. If for any reason we believe that a blind abscess exists, then we should not hesitate to have that case radiographed.

We must first devote our attention to ascertaining whether each patient who comes under our care is being slowly poisoned. If we do this we have performed a most important part of our examination.

Many of us appear to be rather skeptical and believe only a few of the cases of dental infection reported to us. These cases we are told often produce serious systemic disturbances, such as heart valve lesions, arthritis deformans, etc.; others are reported as having fatal results. If even only a few of these cases were true, and we are fully to realize our responsibilities as dentists, can we afford to take a chance in even one such case?

Having then made mouth infection of primary importance in our examination, we will pass to the next step. Teeth in malocclusion: Are any teeth being torn from their sockets every time the patient closes his mouth; is he twisting or pushing any teeth out? If so, we must relieve them; grind them so that all

possible stress is taken from them. Rather grind off any unduly projecting cusp than to dig out a correspondingly deep hole in the opposing tooth, when a filling is placed in it, so that we may accommodate that long cusp.

Remember, if we fail to do this, the result will be locking the bite when lateral motion comes into play, and that tooth will be gradually loosened. Undue stress on individual teeth means inflammation of the peridental membrane and may lead to pyorrhea. Any tooth then with any indication of undue stress is given careful attention, the patient is requested to open and close his mouth while a finger is placed on the tooth which is suspected. It is sometimes surprising to find by this test how much a tooth is being driven out. Articulating paper is also very useful for this purpose. A little time spent in this manner often prolongs the life of a tooth or teeth, and we have accomplished the first step in preventive pyorrhea treatment.

In the next step we look for fillings in which the point of contact has not been restored, places in which food is packing between the teeth, where it would mean a chronic inflammation of the gum tissue, which results in a space for caries to begin; where even with the most scrupulous care on the part of the patient it will be nearly impossible to prevent decay. If the patient is a child, I look for any indications of dental irregularity according to the Angle classification. Adult patients are also advised of any nasal troubles, where such conditions are obvious. Of course, positive diagnoses require the services of a nose and throat specialist.

The next step is to spend a few moments in giving the patient instructions in how to brush the teeth, in how to use floss silk effectively. I like flat floss the best, such as Cutter's. I use a celluloid jaw for the purpose of giving the patient a better idea of the proper manner of applying the brush. The correct size of brush is given some consideration, and I have found patients grossly ignorant on all these subjects. I remember asking an agent of a prominent tooth brush concern, why they made a brush so enormously large, his answer was: "We sell ten large brushes to one of the smaller type." I know that if any one of you had seen that brush you would have readily realized the impossibility of a patient using such an implement effectively.

A few moments spent with your new patient in instructing him in the care of the mouth will be greatly appreciated. I want to emphasize this point because so many patients have expressed themselves as extremely grateful for those few minutes of instructions.

I am now ready to clean the teeth and examine for cavities.

Perhaps it will be of some interest to cite one or two cases in which somewhat serious conditions were found, and I believe would have been overlooked if not entirely, certainly temporarily, if mouth infection had not been given primary importance in examination of those mouths.

The first case was that of a patient who presented for examination, and referred to a cavity in his mouth, which was giving him some trouble. Temporary attention was necessary for that particular tooth. I then began to examine that patient's mouth for abscessed conditions. I noted an upper right canine, which was very dark, and had the appearance of a dead tooth. There was a small filling on the distal surface, but not sufficiently large to have given access into the root canal. The lateral on the same side also had rather a bad color; it had been filled with a silicate cement; the first bicuspid had a gold crown.

When the patient was questioned, he remembered having had a sense of fullness in that region which disappeared and returned at irregular intervals. After a careful examination I could find no fistulas, the teeth were not sore to percussion, and the patient objected to having any teeth opened. A radiograph was then suggested, and it showed an area of infection over the canine and lateral, and was diagnosed by the radiologist as a cyst. The bicuspid had been crowned without pulp treatment, and an area of infection appeared over that tooth also. This latter infection appeared to be distinct from the lateral and canine infection. (These radiographs were shown.)

The bicuspid was opened first and the canals were easily reached, a serous fluid, having the resemblance of pus, at once flowed down in large quantities. The canine was opened next, and by pressing the roof of the mouth a thin watery fluid poured down through the canal, the teeth were treated and the roots filled.

Dr. H. S. Dunning performed root amputations of all three

teeth, and found a very large area of diseased bone, which reached far into the roof of the mouth. Since the treatment has been completed, the patient has remarked that he can accomplish more, and is not nearly so easily tired by his daily work.

Another very interesting case was that of a woman who presented herself for examination with the remark that she had been ill for several months, and was still running a temperature of about 100 degrees. She had been receiving treatment for a streptococcal infection of her tonsils.

She had a tooth which was giving her some trouble and wanted treatment of that tooth before the operation on her throat. I then made the usual examination. There was a bridge on the upper left side extending from the second molar to the second bicuspid, and then to the canine; it was filthy and poorly constructed. I found the molar crown loose, and advised the removal of the bridge. This was done, and was accompanied by the usual odor found in these cases. The molar was soft and badly decayed, and I opened into it at once; a discharge flowed down through the lingual and one buccal canal. I found no fistula in this case and no discharge around the crown before its removal. Her temperature dropped to normal that night for the first time in several months, and remained so.

The patient gave a history of discomfort in the tooth for several years. It seems logical to suppose that the products of the infection were being absorbed.

These cases are old stories, we have heard them before and will hear them again, I only impose them upon you now to emphasize the importance of *seeking* them, to make this part of the examination, of *primary importance*, so we may keep our patients as nearly as possible free from them.

These remarks to-night I believe were to be made principally for the younger men by the younger men, and it is now when our reputations are to be made; later will not do. If we are to strive for the highest standards, it is not too soon to begin; so let us form the habit of having a clear conscience and a desire to do our best *to perform our duty*. Then we may fill the places of the older men whom we admire.

If we will do this then, as dentists, we will be on the right road to answer Dr. Mayo's question in the affirmative.

THE TOOTH BRUSH—ITS APPLICATION¹

PAUL R. STILLMAN, D.D.S., NEW YORK CITY.

After having spent ten years in the endeavor to restore to health those tissues lying adjacent to the teeth, I give you the appalling fact that I have found very few patients who have previously been instructed by a dentist in the correct use of the tooth brush. In my opinion, very few dentists attempt to teach their patients this most important phase of oral hygiene.

It is not sufficient to dismiss patients with the admonition to brush their teeth two or three times a day. Some of the most septic mouths I have seen have been those of patients who have conscientiously brushed their teeth incorrectly, twice daily for years. It is vitally essential that every practitioner should know and adopt a method of using the tooth brush that will really keep a mouth clean; and a technique of mouth toilet should be taught to every patient who presents himself for treatment.

Nearly all that has been taught and practised on this subject is incorrect, and it is the purpose of this paper to give a method of instructing patients that will develop and maintain clean mouths and leave little to be desired in its results.

I wish first of all to condemn the whisk-broom method, or so called sweeping of the teeth as taught by certain oral hygienists, who lecture before Mothers Clubs, school children, etc. It is not my intention to cast reflection on the splendid work done for oral hygiene in general by these men, but their teaching of technique on the subject of the tooth brush is both incorrect and inefficient.

This method was first taught by the late Dr. M. H. Fletcher of Cincinnati, Ohio, and was illustrated by copyrighted drawings. It has been incorporated in Dr. Robin Adair's valuable book "Practical Oral Hygiene" (page 102) where the method is briefly described as follows:

"In brushing the upper buccal surfaces * * * the brush is placed with the bristles pointing straight up, the side of the brush against the gums. A rotary tilting motion revolves

¹ Read before the First District Dental Society, S. N. Y., December 7, 1914.

the bristles, using the hand as the axis, and forcing the bristles between the teeth. Brush the lingual and palatal sides of the teeth with the same position of the brush, bringing the bristles down between the teeth."

Dr. Corley is quoted in the same book (page 58) as teaching this method in an outline for a lecture to school children, and he drives his argument home with this illustration:

"Now let me ask the girls a question: If you were going to sweep the floor of a street car would you sweep it across the car or down towards the end of the car? When you are sweeping the teeth to get them clean, will you sweep across the teeth or down towards the end of the teeth?"

This is how I would answer Dr. Corley's question. If I wished to clean the floor of a street car, I wouldn't sweep it at all. I would get a pail of hot water, soap and a scrubbing brush and I would scrub the floor of the car, and after I had scrubbed it I would rinse it clean. We see too many mouths every day that are swept, and they compare with a clean mouth about as a swept car does with a scrubbed one.

This sweeping method of using the tooth brush was genuinely and earnestly advocated by men seeking a better way than the harmful practice that is still almost universally used by the uninstructed. I refer to the violent mesio-distal stroke similar to that used by the boot black in his work.

We have all observed mouths which show the pernicious effect of this habit. The method is actually harmful.

The brushes I prescribe are always small in size. Small brushes are more efficient for they will reach surfaces that the ordinary size cannot. Usually those sold as "child's size" for adults, but frequently in mouths of mal-occlusion I prescribe the still smaller size. In rare cases when the lower teeth incline lingually, or where certain individual teeth are out of arch alignment, the ordinary type of tooth brush is not sufficiently efficient and I supplement with a porte polisher in which small brushes may be inserted. Where a sincere interest in the care of the teeth is manifested, I find this instrument of great value, but when a tendency for easy methods dominates a patient's mind,

it can hardly be hoped that such painstaking personal care can be inspired.

Each individual should possess three tooth brushes which are to be used in rotation, so that a dry brush be always available, and these brushes should hang in the air when not in actual use.

The easiest and simplest method of instructing a patient in the proper uses of a tooth brush, I think, is to resort to pantomime. The brush should be so held that the bristle ends touch the surface to be cleansed at right angles, as a scrub brush is used.

The stroke as applied, should not have too much pressure. The patient should be instructed to endeavor to clean but one tooth at a time and to avoid the long mesio-distal sweep. System is important; therefore, always use the same systematic procedure. Scrub all the occlusal surfaces first. Scrub one tooth at a time, even if the brush does touch more than one tooth.

This done begin at the disto-buccal angle on the upper right side and scrub each tooth separately advancing from tooth to tooth after a half dozen short circular strokes have been made on each. Bring reasonable pressure to bear on the handle of the brush. This procedure is to be repeated on the lingual surfaces, and it is well to keep in mind that equally painstaking care must be used on all surfaces in the mouth. Scrub as high on the gums as the brush will go. Clean all the surfaces of all the teeth.

Tell your patients that a good habit once established requires no mental effort to maintain, but a bad habit can only be overcome by a combined effort of the intellect and the will. For the first ten days of the new method of brushing, the mind must be concentrated on the work in hand and the will employed, that a new and correct habit may be formed.

Histologically the gingiva is a perfect structure and perfectly fulfils the intention of the Creator. While it is susceptible to infection, it is so formed that it will withstand without injury almost any natural attack that coarse food may give it, provided of course the proximal contact points of the teeth have been preserved.

With normal occlusion and fair general health an individual

will preserve the gingival tissue with as little retrograde metamorphosis as any other tissue of the body. The nearest structural analogy is the tissue surrounding the nails. We observe the same detached border in the cuticle just as the free border of the gums overhangs the tooth. In fact the structural similarity is very striking.

Try this little experiment: Take a little flour of silex, plaster of paris or tooth powder, and rub it upon the thumb nail and well into the cuticle. Now take a tooth brush, laying the bristles flat, and with the same revolving-on-its-axis movement of the brush, as described in the whisk-broom method of sweeping the teeth, sweep the powder toward the end of the nail. You cannot clean that powder from the nail and cuticle in fifty sweeps. If this experiment does not convince you, use a brush on the next patient's mouth, and see how impossible it is to clean the gingival border and the adjacent tooth surface with the whisk-broom technique.

In conclusion, I beg to offer this: It is my positive belief, based upon a practical observation of this important but much neglected subject, that we do not fulfil our obligations to our clientele unless we instruct them in a proper method of brushing the teeth. We must overcome the indifference and lack of knowledge that has existed in the past, and instruct patients in detail how it should be done and insist upon these instructions being properly carried out. This is our plain duty and small as the significance of it may seem, we serve not only the public, but also our own art and profession.

Disease springs from small things. In the neglect of the proper hygiene of the mouth, we have a small thing easily remedied, and since the prevention of disease is the end of our work, let us be big enough to pay attention to it.

THE IMPORTANCE OF ORAL PROPHYLAXIS DURING ORTHODONTIC TREATMENT¹

BY MARTIN C. TRACY, D.M.D., NEW YORK CITY.

PROPHYLAXIS—from the Greek “to guard before.”

Prophylaxis in medicine, in dentistry, and in every day life has become the first principle of health and happiness. It is one of the requirements in religion, and is an indication, if not an assurance, of sanity in the human race. This is the hypothesis on which the progressive practitioner in dentistry of to-day operates. He realizes the necessity of systematic care of his patients, and is particularly active in his procedure with the children. He receives these little patients at a much younger period in life than in former years, and encourages the co-operation of the parents from the very beginning.

The child is taught how to care for his own teeth, and it becomes a necessary habit in his life. The frequent periodical visits to the dentist for prophylactic treatment are a matter of course, and are not accompanied by a feeling of apprehension or a sense of hardship.

There is no specialty in medicine offering greater possibilities for the benefit and uplift of humanity than the field of orthodontia, but it is hard to conceive of another specialty involving so great a responsibility in the care of the individual patient for so long a period of time.

The man who devotes his time exclusively to any one field in dentistry, or any other branch of science, can and does excel, and the principle is fundamentally correct; but simultaneously there is the unavoidable possibility of his forgetting other corrective and preventive measures equally as important for the welfare of the patient. In short, it is safe to make the unqualified assertion that the man best qualified to assume the responsibilities of specializing in orthodontia is he who has had definite instruction and personal experience in prophylaxis and in the general practice of dentistry.

Assuming that the mouth and teeth of the patient present-

¹ Read before the First District Dental Society, S. N. Y., December 7, 1914.

ing for orthodontic treatment are in a perfectly hygienic condition, the systematic cleansing of the teeth during treatment should be carried on by the specialist, or by an associate in close sympathy under his personal supervision.

It is quite as important to know when not to interfere with the abnormal tooth development as when to try by mechanical means to assist nature in avoiding or correcting malocclusions.

The general health, the environment, and susceptibilities of the individual child at once become of vital importance in determining the right time to begin corrective treatment.

The modern theories in orthodontia demand early observation, early diagnosis, and in many instances early treatment. This in itself is in a sense prophylactic, and often is a preventive procedure, but it necessitates the use of appliances at a transitory period in tooth development in the child's life, when metabolism is extremely active, and when, in many cases, without orthodontic interference dental caries is most difficult to control.

The orthodontist resorts to fixed appliances in the correction of malocclusion because he knows if properly applied, definite and positive bone development and tooth movement are accomplished, and I believe the consensus of opinion will favor this modern method as being the most efficient and successful in its results.

The latest teachings are to band nearly every tooth that is to be moved, whether the movement be labially, lingually, buccally, or in rotation, and while it is a system peculiarly efficient, every band may be a menace. In fact, appliances of any character worn for any length of time are antagonistic to cleanliness of the mouth.

Expansion arches, wire ligatures, silk ligatures, jack-screws, etc., while meeting the mechanical requirements in orthodontic treatment are foreign to the mouth, and make prophylaxis most difficult. They invite soft tissue irritation, stimulate a field for pyorrhea, encourage areas of white disintegration of tooth structure, and obviously may very materially interfere with digestion and other general functions. We have all seen these unfortunate results in the mouths of susceptible patients, and, realizing

the possibilities of constitutional disturbances and pathological conditions which can be attributed to mouth infection as a direct or predisposing cause, our duty in preventive measures is clear.

To do harm that good may come is hardly logical in this field, especially when we consider the fact that lost tooth structure is not naturally replaced as are almost all other human tissues. It follows that oral prophylaxis and general hygiene of the mouth should be the first consideration during any procedure in orthodontia.

JOHN MORGAN HOWE, M.D.

MINUTE UPON HIS LIFE AND WORK PREPARED FOR THE FIRST
DISTRICT DENTAL SOCIETY, STATE OF NEW YORK.¹

In every department of life there are men who, from some inherent force of character, stand out from the ranks of ordinary men as leaders in thought and action. Such a one was our loved and honored friend, Dr. John Morgan Howe.

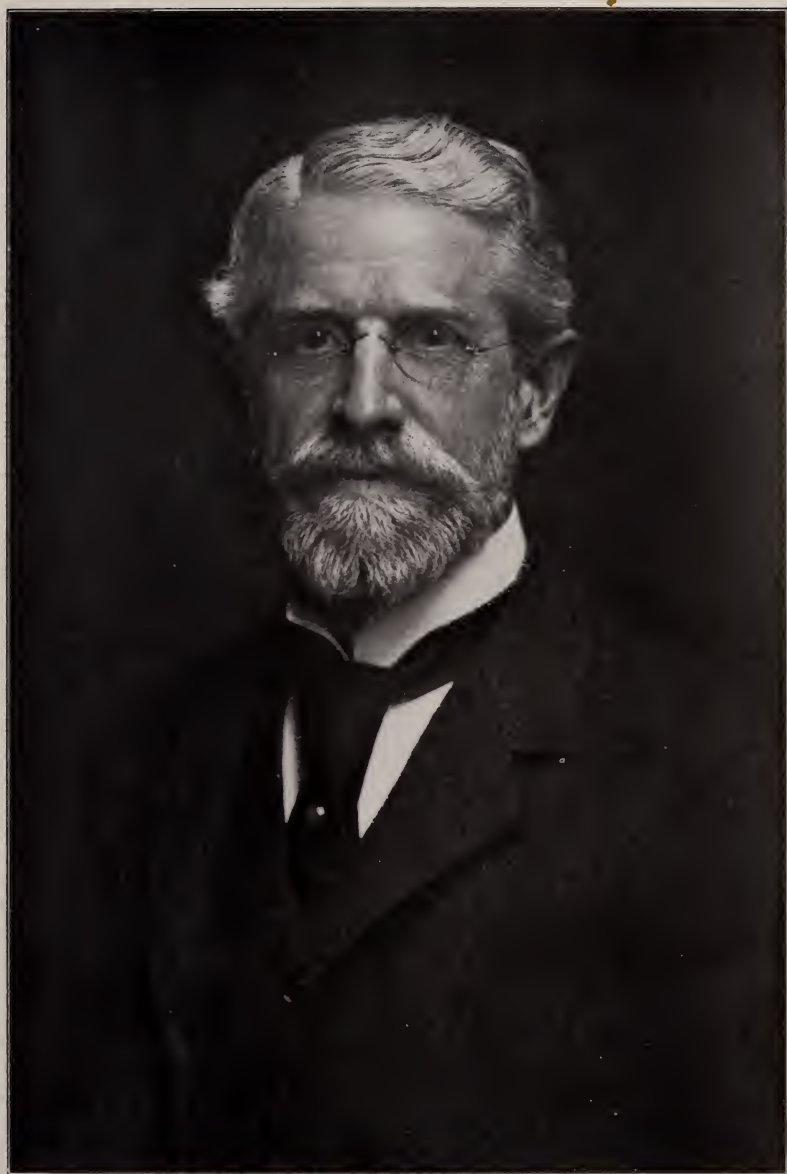
Dr. Howe came of old New England stock, his family having settled in Eastern Massachusetts, building and maintaining for six generations, in the town of Sudbury, on the stage road west from Boston, an inn called the Howe Tavern, which later became famous as the "Wayside Inn" of Longfellow's poems.

Dr. Howe's grandfather, Bezeleel Howe, served throughout the Revolution as Captain of General Washington's Guard. His father, John Moffat Howe, was a dentist, practicing in New York previous to 1838, when he moved office and home to 209 Grand Street, where on October 19, 1844, John Morgan Howe was born. The house is still standing and occupied by a dentist who has a large gold tooth outside as a sign. In 1853, when our John Morgan was nine years old, his father bought a farm in Acquackanonk, N. J., and moved there with his family, continuing, however, the practice of his profession in Grand Street for fourteen years more. In 1867, he gave up his practice in the city, but carried on his profession for a while longer in the new town growing up around his farm.

There being no good school in Acquackanonk, Dr. Howe employed a tutor for his own children and the neighbors, and later built a school house, installing the tutor as master, where the young John and his brothers studied. In 1856 he sent John to New York, to the school of the "General Society of Mechanics and Tradesmen" (founded in 1785), of which society he had been a member since 1828, and in this school John remained for three years—1856, 1857, and 1858—completing his general academic training.

The father, John Moffat Howe, became so prominent in

¹ Read by Dr. Kimball at a regular meeting of the Society, Dec. 7, 1914.



J. Morgan Howe

educational matters, that in 1865 he was appointed by the Governor, Trustee of the State Normal Schools of New Jersey, and held that office for twenty years. Such was the background of our friend's career.

Dr. J. Morgan Howe began the study of his profession in his father's office, assisting him, and succeeded so well that on October 17, 1866, when he was just twenty-two years old, he married Miss Emma Roe, of Passaic (as Acquackanonk was now called), started a home of his own; and the next year when his father left the city, opened an office in Seventeenth Street in the same building with Dr. Littig. During these busy years he studied the required medical and dental subjects and took examinations, receiving the degree of M.D.S. from the New York State Board of Dentistry; but feeling the need of broader preparation, studied in the New York Homeopathic Medical College, from which he graduated in 1879 as an M.D.

In the same year, 1879, he brought his family, wife and three children, to New York, and located at 34 West Thirty-fifth Street for six years, then moved to 58 West Forty-seventh Street, and lived and worked thereafter in that neighborhood. In 1904 his wife died, to him a great loss, as she had been emphatically a helpmeet; but in spite of his grief he threw himself more earnestly than ever into the work of his life. In 1911 he married Miss Paine, and on November 13, 1914, after a period of failing health, he entered into the eternal rest. He is survived by his widow, three daughters, and a son.

He joined the Odontological Society soon after coming to New York in 1879, and became its corresponding secretary, with his customary fidelity attending personally to the laborious duties of the office. Subsequently for many years he was vice-president and president of the Society.

In 1895 he took an active part in founding the New York Institute of Stomatology, of which he was a charter member, devoting much time to its management, subsequently becoming three times its president. When the movement for uniting the four dental societies in New York to form a greater and more comprehensive "First District Society" took shape, Dr. Howe

gave to the movement the help of his voice and influence, throwing himself heartily into the active work of the new body.

He was a member of the Quill Club from 1895 to 1913, enjoying greatly its friendliness and uplift.

As we review his life there were four directions in which Dr. Howe stood out as a leader. The first was in what is called "Independent Journalism." That is the publication by the profession itself of the results of its own observation, study and reflection, uncontrolled by purely trade influences, in such a way as best to help the members of the profession in their development. To working out this ideal he gave wise, strong and effective effort.

He was also strongly opposed to the taking out of patents and the use of secret proprietary remedies by dentists, as injurious to the best interests of the profession, holding that a liberal profession meant service, that *noblesse oblige* was its true motto, a higher standard of professional life being ever before him as a goal.

Feeling deeply the need of dental relief for the poor, in 1901 in connection with Dr. Greer and Mr. J. M. Young, he organized in the St. Bartholomew's Parish-house the first dental clinic in this city, devoting much time and thought to it for three successful years. When Dr. Greer left to become bishop, the conditions became so impossible, that he resigned. Shortly after, with his friend, Dr. Wheeler, he helped in opening the Children's Aid Society West Side Clinic, and served in that until 1905.

But the greatest monument to the memory of Dr. Howe is the work of research now being conducted by the First District Society. His passion for truth led him into experiments and researches to test the relation of saliva to disease. He felt strongly that we as dentists should not stop with merely supplying the losses caused by dental disease, but should set ourselves by study and observation to find out the causes of disease so as fairly to meet and conquer them. In this spirit he personally made studies of the saliva in its relation to dental caries, until he convinced himself, that it was too large a subject to be mastered by himself or any dentist, that it needed the whole time and thought of a specially trained observer and investigator. He corresponded with

the Carnegie Institute, with the Rockefeller Foundation, and finally persuaded Dr. Gies to undertake the work. The Institute of Stomatology had a fund, the "Lord Fund," which could be used for this, and he with his committees availed himself of it. You know the result—the work taken up by the First District—by the National Association, and carried on so wisely and well that we may now feel that we are seeing light ahead, though we are not yet clearly out in the sunshine of fully established knowledge.

Dr. Howe possessed a personality of singular charm. He was a tall, well-built man, with a grave and dignified manner, a refined and thoughtful face, that easily broke into a winning smile. His speech was somewhat slow, but forceful, his voice low and well modulated. To these gifts of person he united a character of such integrity, gentleness and strength, that all who came near him felt his charm. He had a passion for truth, and was a steady, persistent worker, reader, thinker and writer, with a good forcible style. With these qualities he speedily stood out among us as one of the men to be relied upon in every good cause.

In his deeper life he was an earnest and consistent Christian, a member of the old Church of the Covenant, and for many years a useful teacher in its Covenant Chapel Sunday School till the demands upon his time and strength compelled him to withdraw from that form of activity. When the Church of the Covenant merged with the Brick Church, he came into that organization, remaining until his death.

Besides all these elements of force, he was emphatically a man of vision. He lived and worked, thought and wrote in the present, but the future held his gaze, fixed upon a higher, nobler ideal of professional life, a broader thought, a grander achievement, and it was this vision that dominated his life.

CHARLES OTIS KIMBALL.

**DEDICATION OF THE EVANS DENTAL INSTITUTE,
UNIVERSITY OF PENNSYLVANIA**

FEBRUARY 22, 1915

The dedication of the Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, which took place on February 22, 1915, was a memorable event in the history of dentistry. The splendid building at Fortieth and Spruce Streets, Philadelphia, held nearly two thousand persons, gathered from all parts of this country and abroad; the addresses and other exercises were impressive, and good fortune and spring sunshine smiled upon all.

Following a luncheon to guests, alumni and officers of the University, at Houston Hall, a general assembly was called and the procession started at about two o'clock in the following order:

University Band and Glee Club, Students of the Dental School, President, Officers and Trustees of the Evans Institute, Provost, Vice-Provost and Trustees of the University, speakers and special guests, National, State and City Officials, Members of the Dental Faculty, Presidents of Universities and Colleges, Alumni of the Dental School, Representatives of Universities, Dental Schools, Colleges, Scientific Societies and Schools.

Passing through the University quadrangle, and thence into Spruce Street, to the new building, this large body of visitors marched up into the Infirmary—a room of ample size, but soon filled to the doors.

Then followed the formal exercises:

Invocation.

Music: "America."

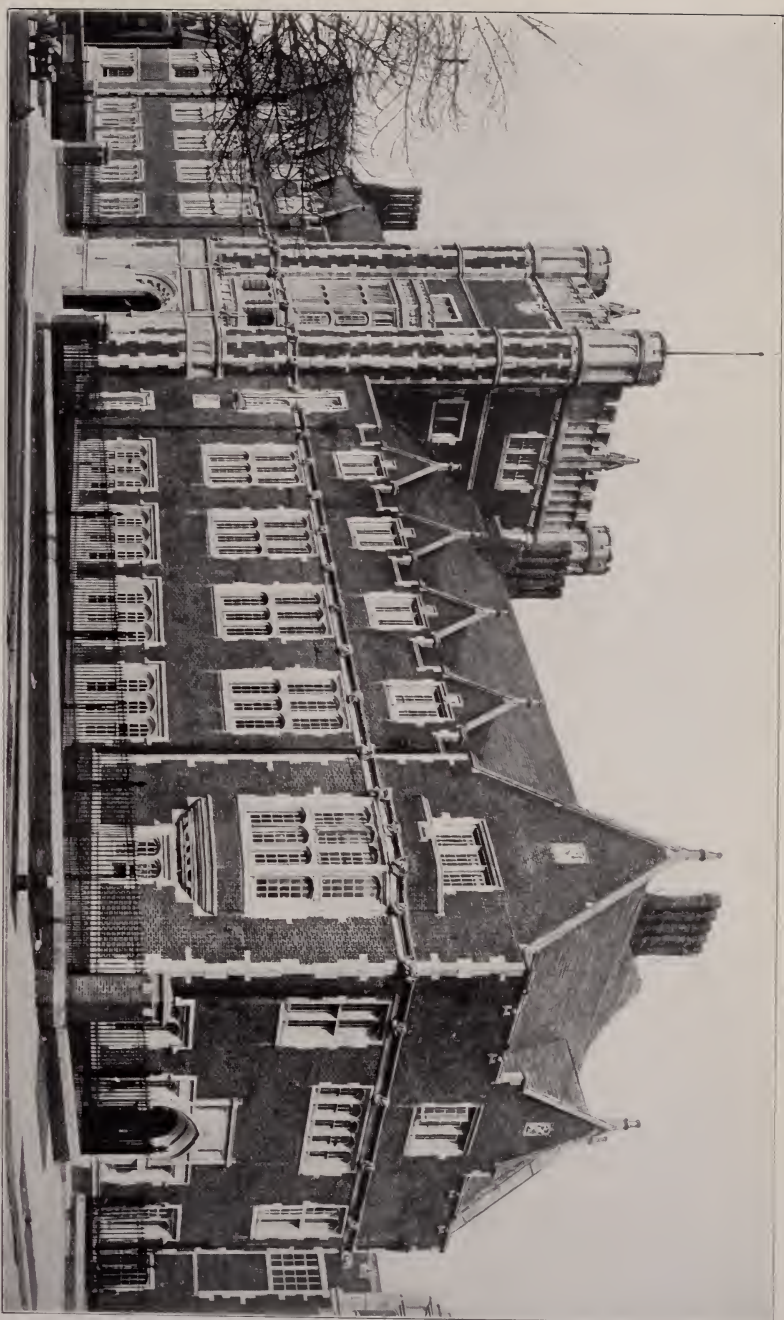
Formal Addresses, as follows:

Dr. Charles Godon, of Paris, France.

Prof. Dr. Wilhelm Dieck, of Berlin, Germany.

Mr. John Howard Mummey, M.R.C.S., LDS., of London, England.

Dr. William Simon, of the Baltimore College of Dental Surgery.



THE THOMAS W. EVANS MUSEUM AND DENTAL INSTITUTE SCHOOL OF DENTISTRY, UNIVERSITY OF PENNSYLVANIA

Dr. Edward C. Kirk, Dean of the Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania.

Presentation and Formal Opening of Building :

Presentation of key by the Architect—John T. Windrim, Esq.
Acceptance on behalf of the Thomas W. Evans Museum and Institute Society—Hon. John Weaver, President.

Remarks on behalf of the Trustees of the University—Dr. Edgar F. Smith, Provost of the University of Pennsylvania.
Conferring of Honorary Degrees by the Provost of the University.

Music: "Hail! Pennsylvania."

Benediction.

Dean Kirk read a letter from Dr. Godon, and a cablegram from Dr. Dieck, transmitted by the Secretary of State. Both these gentlemen had been unable to leave their countries, owing to the war.

The honorary degree of Doctor of Laws was conferred on Dean Edward C. Kirk and Prof. Edwin T. Darby; the degree of Master of Science in Architecture on John T. Windrim, and upon the following eight men the degree of Doctor of Science: William Simon, Truman William Brophy, Edward Hartley Angle, Eugene Solomon Talbot, John Howard Mummery, Edouard Charles Godon, Wilhelm Dieck, Greene Vardiman Black.

Each candidate was escorted to the platform by two sponsors, and in conferring the degrees Provost Smith said:

"John Torrey Windrim—Quiet student of design, rearing structures here and there in your native city which, in their silent dignity and impressive idealism, attest your talent, observed also in this very building, the latest expression of your architectural power."

"William Simon—Revered teacher and brilliant experimenter in chemical science, which has contributed more than all other sciences combined to the happiness and welfare of mankind.

"Past master in the art of chemical analysis, whose books on this subject have appeared in many editions.

"A leader in pharmaceutical studies."

"Truman William Brophy—Known throughout the world for rare achievements in oral surgery, with a marvelous record of successful operations conducted on original plans."

"Edward Hartley Angle—Lover of art and nature, intimate friend of trees and flowers, but pre-eminently founder of the science of orthodontia to which the best thought of a life has been given in experiment and in text."

"Eugene Solomon Talbot—Earnest advocate of broadest scientific preliminary training for the dental profession.

"Author of notable books and pamphlets.

"Researcher, whose discoveries have attracted world-wide attention and received deserved and extended commendation."

"John Howard Mummary—Acknowledged leader of the dental profession in England.

"Authoritative writer upon calcification of tissues and the structure and development of dentin, with numerous other experimental contributions, characterized by originality and permanent value."

(In absentia)

"Edouard Charles Godon—Leader of the dental profession in France, chevalier of the Legion of Honor because of distinguished services to education; voluminous author, wise counselor, accomplished diplomat, inspiring leader, servant of humanity."

(In absentia)

"Wilhelm Dieck—Distinguished teacher, investigator and writer, occupying a position of eminence in the University of Berlin; decorated by royalty in Prussia, in Sweden and in Saxony, whose literary and experimental labors have won the approbation of your colleagues everywhere."

"Greene Vardiman Black—Repeatedly honored for noted works translated into many languages, telling the story of 'Poisons from Micro-organisms,' 'The Pathology of Dental Pulp,' 'Physical Character of Teeth in Relation to Disease,' and the elucidation of many perplexing and obscure problems in

the gateway of life. One whose life inspired has touched the throng, who gives but that which good could well beget."

"Edwin Tyler Darby—Credited with an enviable list of contributions in your chosen field of endeavor, designer of scientific instruments used throughout the world, medallist for distinguished service in the science and art of dentistry, godfather of this Dental School of our University. A man rich in all that makes true wealth, the respect of neighbors and unalloyed affection of friends. One of those 'golden natures' which help us to form our ideals of life."

"Edward Cameron Kirk—Dean and elder brother in this splendid school, suggestive teacher, noted investigator, prolific author, careful editor, a mighty moral force, operating to elevate the standards of your profession to what they should be and what they can be—ceaseless, untiring seeker after truth.

'The voice that comes from the gilded peaks,
From the topless heights of a man's own dreams
This voice goes wandering by;
And who roams the earth with an open heart,
With an ear attuned to hear,
Will catch some broken chord of the sound
Whenever the voice comes near.' "

The following details concerning the building, and the sketch of Dr. Evans' life, are quoted from the official programme:

The new building is in the Tudor style of architecture which prevailed in the time of Henry VIII and might be described as Collegiate Gothic, being in keeping with other late buildings, constructed of Indiana limestone and hard-burnt brick. It was designed by John T. Windrim. Ground was broken on September 24, 1912, and the cornerstone laid on May 3, 1913. The building has a frontage on Spruce Street of 242 feet, and a depth to Irving Street along Fortieth Street of 161 feet. It is built in the form of the letter H and has three stories over a high basement. The benefaction of Dr. Evans includes this building with its equipment and a substantial endowment fund.

Among the interesting features of the building are the square tower and the Evans Museum. The tower, which is at the main entrance, at the center of the Spruce Street wing, is thirty-eight feet square, rising to eighty-four feet. In the center of the tower, beginning at the second story

and reaching almost to the top of the third floor, is a large window which lights the library on the second floor.

The Evans Museum occupies the east half of the Spruce Street wing, and is as nearly fire and burglar proof as modern science can make it. This houses the priceless Evans collection.

In the west end of the Spruce Street wing are the offices of the Dean of the Institution, and the board-room. The rest of the ground floor is divided into class-rooms and laboratories, the entire north wing being devoted to this purpose. To the right and left of the monumental hallway, which extends from the roof to the first floor, are rooms for various phases of clinical dental service, radiography, photography, instructors' rooms, etc., and a model dental office.

Another of the imposing features of the building is the large operative clinic hall in the north wing on the second floor. This occupies the entire wing on Irving Street and is two hundred feet long by forty-eight feet wide.

This clinic room is thirty feet high, with a glass wall on the north side; the roof for a distance of about ten feet is also glass, giving all the daylight possible. The floor is covered with battleship linoleum. A gallery on the south side contains the lockers. The room is furnished with 135 chairs, each chair equipped with electric service for power and light. There is also gas, compressed air and water service to each chair.

In the south wing, on the second floor, is the library, which extends up through the third floor, with galleries on each side. From the library, on the east end, extends the main lecture hall eighty-seven by forty-three feet, and on the west end are two smaller lecture rooms. One of the principal objects of the Institute will be the encouragement of research work, and a number of rooms for that purpose are on the second floor.

The main stairway ends at the second floor in a large hall open to the roof. The side walls of this hallway are in pinkish gray stone, and the ceiling is of metal and plaster, formed and painted to represent the carved wooden ceilings of the Tudor period.

Large laboratories, with lighting similar to that in the clinic, occupy the south wing on the third floor, and other rooms for research work and post-graduate instruction in the western end.

In the basement are locker rooms for the students, laboratories for mechanical dentistry, the metallurgical laboratories, and laboratories and lecture rooms for first year men, and a restaurant for students and faculty. The power house adjoins the building on the north. This contains two boilers with a capacity of 400 horse power. The engines and electric generators are capable of producing 240 kilowatts, and will furnish power for the lighting and heating as well as for the laboratories and the chairs in the clinic.

The School of Dentistry at the University was organized in 1878, being the third dental school in America to be connected with a University.

The Dental School is the most cosmopolitan of the departments of the University, its students usually representing about twenty-five foreign countries and almost every State of the Union. It now has a teaching staff of eighty-three professors and instructors, and six hundred and sixty-five students. The school operates a free dispensary in which about 40,000 cases are treated annually.

When the school was first organized it occupied for a short time a room in the old Medical Hall (now Logan Hall), and subsequently quarters in the Hare Laboratory of Chemistry at Thirty-sixth and Spruce Streets, but in 1896 it removed to a building especially constructed for it. There its growth has been remarkable, and it has long since outgrown its "new" quarters. It now enters into its fourth home, The Thomas W. Evans Dental Institute.

By concurrent action of the Trustees of the Thomas W. Evans Museum and Institute Society and the University of Pennsylvania, an agreement between them was executed on Saturday, June 15, 1912, by the provisions of which a co-operative affiliation of the two institutions was consummated, so that the resources of both have been utilized in the creation of a dental school to be carried on "as such institutions of learning are now conducted in Philadelphia, and not inferior to any already established," as provided for in the will of the late Dr. Thomas W. Evans, an eminent scientist and dentist who practised in Europe, but who was born in Philadelphia, and lived in a house which stood where the building bearing his name now stands, and which houses the affiliated institutions at the northwest corner of Fortieth and Spruce Streets.

The Committee in charge of the Dedication consists of Matthew H. Cryer, Edwin T. Darby, Alfred P. Lee, O. C. L. Lewis, H. B. McFadden, Louis C. Madeira, John Marshall, Frank P. Prichard, John A. Reimold, Henry Rainey, Edgar F. Smith, R. H. D. Swing, Charles R. Turner, L. N. Homburger, Frank A. Fox, Edward C. Kirk, Chairman; George E. Nietzsche, Secretary.

The Honorary Committee consists of the Chairman, Hon. John Weaver, and Doctors C. Channing Allen, Walter F. Barry, Arthur D. Black, Shirley W. Bowles, Fred W. Briggs, I. Norman Broomell, Harvey J. Burkhart, S. P. Cameron, William Carr, Calvin S. Case, John V. Conzett, William C. Crenshaw, Harold De W. Cross, George D. B. Darby, John F. Dowsley, Frank A. Delabarre, William B. Dunning, Mark F. Finley, William W. Foster, Donald M. Gallie, Edward S. Gaylord, Henry W. Gillett, Clarence J. Grieves, Charles A. Hawley, Ellison Hillyer, Neville S. Hoff, Rudolph Hofheinz, Robert Huey, L. Foster Jack, William Jarvie, Charles N. Johnson, Edward I. Keffer, John H. Kennerly, George C. Küsel, Edward G. Link, William H. G. Logan, James McManus, Daniel N. McQuillen, Louis Meisburger, Herbert C. Miller, Joseph W. Noble, Rodriguez Ottolengui, Alfred Owre, John D. Patterson, Weston A. Price, Chester B. Reed, Howard S. Seip, Frank I. Shaw, Edgar F. Smith,

Eugene H. Smith, Harold A. Smith, B. Holly Smith, William D. Stevenson, Burton L. Thorpe, William H. Trueman, William Wallace Walker.

THE LATE THOMAS W. EVANS.

Thomas W. Evans, the founder of the Thomas W. Evans Institute, was born in Philadelphia, December 23, 1823, and died in Paris, France, on November 14, 1897, shortly after his return to Europe after a brief visit to America. As a boy he lived with his parents in the house which stood on the lot at the northwest corner of Fortieth and Spruce streets, where the new building now stands as a permanent monument to the great American dental surgeon. He was the youngest of three sons, Rudolph, Theodore, and Thomas, the subject of this sketch. He was educated in the common schools of Philadelphia, and at the age of fourteen entered the employ of Joseph Warner, a gold and silversmith of Philadelphia, whose business included the manufacture of certain surgical instruments, and incidentally of plate, solders, and some of the implements used by dentists. His apprenticeship with Warner brought him into occasional contact with dentists of that period and their methods, and in that way he no doubt derived the impetus which led him later to enter upon the study of dentistry as a profession. In 1841 he became a student in the office of the late Dr. John De Haven White, of Philadelphia, with whom he remained for two years. During his studies with Dr. White he attended lectures at Jefferson Medical College, from which, in due course, he was graduated.

He practised his profession for a time in Maryland, and later, in partnership with Dr. Philip Van Patten, at Lancaster, Pa., with whom he remained until 1847. It was during his stay in Lancaster that Dr. Evans performed a series of gold contour filling operations which he exhibited at the annual exhibition held under the auspices of the Franklin Institute in the fall of 1847, and for which he received a gold medal in recognition of the novelty and merit of his work. Dr. C. Starr Brewster, an American dentist practising in Paris, had his attention called to this work done by Dr. Evans, and was so impressed by it that a partnership was arranged between them.

The partnership between Drs. Brewster and Evans lasted until 1850, during which year Dr. Evans opened an office on his own account in the Rue de la Paix, and entered upon a professional career which was as wonderful as it was unique.

Although Dr. Evans was not the pioneer American dentist in Europe, he brought to Europe a combination of personal characteristics and special technical ability which not only made him a conspicuous figure, but gave an impetus to dental practice and a status to its representatives before unknown.

Dr. Evans as an operator may have had many peers, and in recent

times many who excelled him as a practitioner. There are not wanting those who place but light estimate upon his abilities as a dentist, and who attribute his phenomenal success to abilities quite apart from his skill as an operator. There is, however, evidence tending to show that he was an operator of more than usual ability.

His professional equipment in itself cannot be regarded as the cause of his phenomenal success. His abilities as a practitioner were merely a contributing factor in a complexus of characteristics which have helped to make Dr. Evans the most conspicuous figure connected with dentistry. Dentistry became to him the stepping-stone which served as a means of bringing him into contact with those to whom he made himself of value and who contributed substantially to his success. He was a born diplomat, possessing a keen perceptive faculty which enabled him to read and correctly understand human nature, delicacy and firmness in his treatment of affairs, a rigid honesty of purpose, and a foresight which was intuitive. In short, he knew how to make the best of his opportunities, and in some degree create them. His association with Dr. Brewster brought him into contact with the aristocratic element of French society; it was his avowed ambition to secure for his clientele all of the crowned heads of Europe, and it has been asserted that in this he succeeded. By his skill and attractive personality he drew them to him and won their confidence. His confidential relationship with Napoleon III. has become historical, and its two most important results—namely, the diplomatic mission intrusted to him by Napoleon to President Lincoln during the war of the Rebellion, which resulted in the neutrality of France with respect to that issue, and the aid rendered by him to the Empress Eugenie in her escape to England during the riots following the fall of Sedan at the close of the Franco-Prussian War—are matters of common knowledge.

It has been stated that Dr. Evans owed his fortune to the patronage shown him by Napoleon III. This is not wholly true. It is a fact that the doctor's reputation was greatly enhanced by the confidence of the French Emperor, and that his list of patrons was greatly enlarged as a result, but by far the greater portion of his accumulated wealth was due to the real estate investments made possible through the personal friendship of the Emperor.

Much of Dr. Evans's life was devoted to works of charity and philanthropy. He rendered important service during the Crimean and Franco-Prussian wars in the care of wounded soldiers, and in introducing more sanitary and humane methods in military hospitals. Sent by the Emperor at his own suggestion during the Crimean War, to study the sanitary condition of European camps and hospitals, he was so impressed by the pictures of misery and suffering there presented to him that on his return he secured the interest of the civilized world in important measures of reform. His record during the late Civil War in the United States will be found in the history of the United States San-

itary Commission, which he organized in Philadelphia, coming over especially to serve his native land in the hour of need. During the Franco-Prussian War he was probably the only man in Europe who might pass from camp to camp. During all this memorable campaign he personally directed the movements of the ambulance corps of the Red Cross Society.

It was the elements of character which led him to undertake such work and the associations which it made for him that more than all else contributed to his reputation and material success. Throughout his whole career he never forgot, and indeed constantly emphasized, two facts: that he was an American; and that he was a dentist. In his loyalty to his profession he was steadfast; his faith in its possibilities was unfaltering; he was always the champion of high professional ideals. The principles which animated his professional life he manifested from the beginning of his work, and were in marked contrast with those of many of his early confreres. In a communication written soon after he located in Paris, he said: "I may have but little to impart, yet that little is at the service of each and all members of my profession; and gladly would I hail the day that should make all that is sound in science and valuable in art common property. . . . By the discussion of subjects connected with our profession and by the contribution of each according to his ability, by the comparison of the different modes of practice and the making known all new discoveries and improvements, we shall place the profession on more commanding ground, and better serve the generation in which we live."

That his professional life was lived in harmony with these principles the results show. The measure of success which he attained was not limited to material acquisitions, but was extended to the elevating influence which he exerted upon the general status of his profession. He lived to see his chosen calling placed upon more commanding ground, and the value of its ministrations to his generation substantially recognized.

Dental education has received a distinct impetus through the endowment which created this fine building, so completely equipped in every teaching facility known at the present day. A new high water mark has been recorded, and it stands as a noble monument to its donor. Dental science is rapidly entering new fields, and assuming responsibilities no less than those directly underlying human life. The establishment of this seat of learning brings reassurance that the dental practitioner of the future will meet the great work which is to be his privilege and duty.

W. B. DUNNING.

REPORTS OF SOCIETY MEETINGS
FIRST DISTRICT DENTAL SOCIETY OF THE STATE
OF NEW YORK

December 7, 1914.

A regular meeting of the First District Dental Society of the State of New York was held at the Academy of Medicine, 17 West Forty-third Street, New York City, on Monday evening, December 7, 1914.

The President, Dr. S. E. Davenport, occupied the chair and called the meeting to order.

The President announced with great regret the death of two prominent members of the Society, Dr. J. Morgan Howe and Dr. James Truman.

Dr. Charles O. Kimball read a minute on the life and work of Dr. Howe.¹

The program of the evening consisted of four short papers by Dr. Oscar Jerome Chase, Jr., entitled "Examination of the Mouth;"² Dr. Forry R. Getz, entitled "Bridgework Restorations Without Extensive Cutting and Mutilation of Tooth Structure;"³ Dr. Martin C. Tracy, entitled "The Importance of Oral Prophylaxis During Orthodontic Treatment,"⁴ and Dr. Paul R. Stillman, entitled "The Tooth Brush, Its Application."⁵

Discussion of Dr. Chase's Paper.

Dr. W. B. Dunning—I think this is an admirable paper. I only wish to make one practical suggestion. In the routine examination of the mouth, it is a good plan to test the teeth for vitality as you go along. The radiograph is very useful, but it is astonishing how easily you can be mistaken, and how different the various pictures of the same teeth will look.

I am prompted to make this suggestion because of a case I examined the other day—a gentleman sent to me by a prom-

¹ See p. 52.

² " " 40.

³ " " 36.

⁴ " " 49.

⁵ " " 45.

inent physician. He had with him ten or a dozen radiographs. His teeth were a splendid set for a man over fifty years of age—no pyorrhea, and in good condition. A radiographer who had evidently done more general than dental work had taken these pictures, and had indicated by means of arrows areas showing shadows which in his opinion were foci of infection. Over the upper molars, shadows which to most of us would indicate the antral cavities, were pointed out by him.

Upon examination for vitality by means of heat and cold, and a sharp excavator at the neck of the tooth, I discovered that with the exception of two teeth which were suspicious, every other tooth was in normal condition.

He was suffering from an arthritis, and he came with the idea that every tooth was to be removed. He said to me "You know, it is not a question of teeth, but a question of general health. Do you think my health would be improved if I had them all removed?"

I said "Those teeth, excepting two, are just as normal as the finger on your hand. It would be like cutting off a healthy finger to remove those teeth."

I have not heard from the patient since then.

The radiograph, however important, is not everything. It seems to me our examinations are frequently made without this routine habit of ascertaining which of the teeth in the mouth are vital, and which are not.

Dr. H. C. Croscup, Brooklyn—I feel that this paper is a very apt one, and the story of the patient with the fluctuating temperature recalled to me that a short time ago I had a communication from a surgeon at St. Luke's Hospital. The patient had been taken there for typhoid fever. The period of the typhoid had run the full specified time, and all evidence of typhoid germs had disappeared, but still there was a steady running temperature which could not be overcome.

The surgeon, in trying to ascertain the cause, looked into the patient's mouth and discovered that there was some discharge of pus from around one or two of the teeth. He telephoned to me and asked me to come and see her, thinking this discharge of the mouth might have something to do with the rising tem-

perature, as he seemed to find no other cause for it. I went over and looked at the two teeth, a lower canine and a lateral. Both of them were in pyorrheal condition. The canine was discharging considerable pus—the lateral not so much. The patient was wearing a partial lower denture, so I concluded the best thing to do was to cure the pyorrhea, which we did (by taking out the teeth). That was two weeks ago.

I called up the surgeon last Friday, and he said the patient had progressed very satisfactorily from the time the teeth were extracted. He asked me if I thought there would be any further discharge, and I said I did not think there would be, and there was not. We irrigated well and applied iodine for several days consecutively. He said the patient was now on the rapid road to recovery. The temperature had begun to fall, in fact was almost normal, and he could not account for the former condition in any way except that it was caused by this infection in the mouth. That, I think, shows conclusively that it is very important to examine the mouth, as Dr. Chase suggested, for evidence of pus.

Dr. Dunning said the radiograph was sometimes unsatisfactory, and I had a little experience in that way recently. A patient presented himself, who had been complaining for a week or more of an intense neuralgic pain. He could not of course tell exactly where it was, but said it ran from the right canine back to the second upper molar and back again to the canine. It seemed to jump back and forth.

The first molar had been extracted about three weeks previous. I examined the other teeth and could find no evidence of trouble. The teeth were in perfect condition, and I suggested a radiograph. He was a man who was very impatient about everything. He knew somebody in every line of work, and he said he knew a man who could take the radiograph. So I told him to go ahead. He brought it back to me. The report was that the sockets where the first molar had been extracted showed very deep shadows, and the radio diagnosis was that one or more of the roots of this molar had been left there. I had probed those sockets, and found nothing, so I called the radiographer on the 'phone and asked him if he was perfectly sure of his diagnosis, and he said without a doubt the roots were there.

I thought if he was so absolutely sure, it was worth while to go further and see what I could find. With the use of considerable novocain, getting a good local anesthesia, I curetted all of the three sockets, and went up to the floor of the antrum, and there was positively no trace of roots there whatever. I still have the patient under treatment and observation for his trouble, and I am not sure that we will find the cause. This seems to prove that the radiograph is not always reliable.

That is about the first thing I do in making an examination—look for possible infection. I was very much interested in Dr. Chase's paper.

Dr. Wm. C. Fisher—Dr. Chase referred to Dr. Mayo, when saying that systemic disease is oftentimes due to mouth infection. At the meeting of the American Medical Association this year, in the Section of Stomatology, we had a symposium on that subject. Addresses were made by Dr. Frank Billings of Chicago, Dr. Charles Mayo and Dr. Rosenow of Chicago—one of the greatest bacteriologists in the country to-day. Those papers were just published (December 5th) in the Journal of the American Medical Association, and I think every dentist would profit greatly if he would procure a copy of that journal and read those papers. It bears out everything Dr. Chase has said, and a great deal more. I should preface that by saying that these men were collaborated with by Dr. Morehead, the dean of the University of Chicago, and they gave ample credit to him for his aid.

Dr. Billings laid stress on the fact that the treatment of many diseases, especially of the heart, to-day call for the assistance of the dental surgeon; and he, together with Dr. Mayo, was very emphatic on this one point, that they never undertake treatment of any chronic cases whatever, without the aid of the dental surgeon.

Dr. Dunning says you cannot depend entirely on the radiograph. Before I resort to the radiograph I examine for dead teeth. I use a very small electric light placed in front of a mouth mirror, reducing my current by sending it through an ordinary blue electric bulb. I use a blue globe to cut out the yellow light. The rays will penetrate a live tooth, but not a dead tooth. I think you can detect the dead teeth in nineteen out of twenty

cases. The X-ray will come in very nicely afterwards to find out if you have properly treated your root.

A case was referred to me about six or seven weeks ago. A gentleman had injured his knee. There was history of fourteen months local treatment, and the knee would not heal. There was an open wound discharging pus. The patient had been examined by a rhinologist for infections of the throat and nose; he found that field clear. The physician then insisted there must be an absorption of pus from some other place, and he suggested the mouth. The examination revealed very severe pyorrheal conditions. I suggested to the physician that before I began to clear the field of infection in the mouth, perhaps he would want a vaccine culture. He thought it would be a good idea. I thought there was sufficient pus in the mouth to cause the trouble. I took a culture and sent it to a laboratory and it developed pure streptococci.

We treated it with the result that within five weeks the wound began to granulate, and yesterday the physician in charge reported to me there was healthy granulation, and we could fully expect that the wound would heal in about two weeks.

Another case came to my notice last Spring. Dr. Austin, a surgeon in Westchester County, was subjected to a severe staphylococci infection. He could not go into the operating room. The slightest scratch in touching an instrument would cause a severe infection. It would appear as little boils on his forehead. He had read one of Dr. Mayo's reports, and that was the first time that this subject came to his mind, and he came to me for examination of his mouth. I noticed at once a bridge, and the removal of it showed an old root with a great pus pocket. Removing the root, and curetting the pocket, caused it to heal up entirely, and for eleven months he has had no trouble whatever with his usual tendency to infection and he is to-day one of the greatest believers in Dr. Billings' and Dr. Mayo's theory.

Dr. Chase—I would like to ask Dr. Dunning a question, since he spoke of the radiograph, because in the case which I passed round, Dr. Dunning suggested opening the teeth first. I would like to ask him how he tests his cases for dead teeth. I

have used ethyl chloride with the rubber dam, but it is not very satisfactory, and often I have opened into the teeth and found them alive.

These are really old stories, but we should be more careful and try to seek the causes in our first examination, and not allow the patient to come several times. Before I had adopted this method of examination, I often had patients come three or four times before I discovered that they had abscessed conditions, because I was careless.

I think sometimes you will find serious conditions in this way, that perhaps you would not find in other ways.

Dr. Dunning—A very excellent way is the reflected light suggested by Dr. Fisher. Another way is by means of a hot instrument, or a splinter of ice,—and still another, is to take a sharp excavator and reaching just under the gingival border, press against the tooth and you will very often get sensation. When these quick and simple tests fail, the radiograph is in order.

Discussion of Dr. Tracy's Paper.

Dr. J. Lowe Young—I quite agree with the essayist, as to the necessity of great care being exerted during orthodontic treatment, to insure thorough mouth hygiene. I believe if the necessity of thorough brushing of the teeth has been sufficiently impressed on young children, and they form the habit, it is likely to follow them through life, and in this way a great benefit is done to humanity. There is an old saying that it is hard to teach an old dog new tricks. This applies to human beings as well as dogs.

Regarding bands as used with the modern methods in orthodontia, I am of the opinion that if accurately fitted and thoroughly cemented, they are a protection rather than a menace to the teeth. I made it a practice for many years when treating children with mixed dentures to apply anchor bands on the second deciduous molars and now I always put them on the first permanent molars, if they are sufficiently erupted for me to do so, as I have found that these teeth are far less liable to decay when protected by a well fitted, thoroughly cemented band. Any attachment on the buccal surface of a band on the second

deciduous molars renders the proper cleansing of the first permanent molars much more difficult, and it is owing to this fact that I now use the first permanent molars as anchorage whenever it is possible to do so.

Dr. Frederick C. Kemple—The essayist has laid the ax at the root of a serious condition when he emphasizes the importance of mouth hygiene during orthodontic operations. There can be no question but that every regulating appliance, no matter how delicately constructed, or how accurately or carefully fitted, interferes to a greater or less degree with the cleanliness of the mouth by making it more difficult for the patient properly to brush and cleanse his teeth; and just to the degree that the appliance prevents ease of cleansing the teeth does it become a menace.

It is vitally important, therefore, that the teeth receive better prophylactic care during orthodontic operations than at any other time, and I believe that in the hands of nearly all orthodontists they do receive such care.

If we wish to discuss this question in the broadest sense it may be well for us to bear in mind that it is not uncommon for cavities to develop in the teeth of children, between the ages of six and fourteen years, who have never worn a regulating appliance. And with this fact in mind, it would hardly be a fair verdict to say that all cavities which may have birth during orthodontic treatment are produced by the appliance which is being worn. But I believe there is an inclination on the part of many to render such a verdict.

In my opinion, orthodontic appliances that are properly constructed and adjusted can be held responsible for but very few cavities of the teeth, even in mouths that receive only ordinary hygienic care. In fact, when ordinary hygienic care is observed by the orthodontist, I believe that fewer cavities have their incipience during his treatment than would be likely to occur in the same mouth if it were not having orthodontic treatment. The weekly or bi-weekly cleansing that is usually given during this treatment is, in my opinion, a very considerable factor in preventing caries.

Besides lack of cleanliness, a more serious menace to the

teeth, that can with all fairness be laid at the door of orthodontic operations, is that resulting from poorly adjusted appliances, ill fitting bands, misuse of ligatures, etc., etc. Injury from such appliances usually affects the periodontal membrane, which I regard as more serious than caries.

I compliment the essayist on the force of his paper, and can have no argument whatsoever with him on any point brought out in his presentation of the case; the subject is a most important one, and it might be well to discuss it at regular and frequent intervals, lest we forget how important it is.

I should like to hear this paper discussed by the general practitioner more than by the orthodontist. He sees from a different standpoint the results of the work that some of the rest of us are trying to do, and it is a good thing for all of us occasionally to "see ourselves as others see us."

Dr. H. W. Gillett—Some of Dr. Kemple's remarks gave me the text of what I wanted to say. I do not desire to voice criticism of the orthodontists, because there is little to criticise in the work I have seen from their hands. I have heard of some unfortunate cases, but I have not seen them. It has seemed to me, for some time, that there was a certain amount of risk in following out the idea that Dr. Angle was rather strenuous about in the early part of his work, in teaching the specialty of orthodontia.

Those of us who have been a dozen or fifteen years in practice, remember how emphatic Dr. Angle was on the point that he could make a much better orthodontist of the man with little experience in general practice, than of the man who had had ten or fifteen years. There are Angle men here, and they will correct me if I am misstating. While it may be true so far as the teaching of orthodontia is concerned, that the man just out of dental school, or the man with but very few years practice, is in a more moldable condition; it is also true that man has not had sufficient general practice to realize some of the dangers he must meet and avoid. I have a feeling that some of the sad histories of cases I have heard of—I say frankly that I have never seen such cases—have been brought about in just that way—at the hands of men who lack the experience necessary for knowing just

what will happen from ill-fitting bands and poorly adjusted ligatures.

I have the greatest admiration for the earnestness and care of the orthodontists in their field, but there is a question in my mind if there is not a tendency in teaching their specialty, to overlook the fact that the very young man lacks sufficient breadth of experience, and a question as to whether they might not wisely add to their courses the recommendation that such men take additional instruction along carefully selected lines which shall fit them to see more broadly than they do when concentrating only on the special line they are practising.

That is one of our own difficulties—we see too little. We concentrate too closely upon the individual tooth and the individual piece of work without giving sufficient consideration to the masticating organ as a whole, and the relation of it to the particular element we, at the moment, have under consideration.

Dr. Wm. C. Fisher—Two points came to my mind. One is, I think we have very little to fear from the orthodontic appliances that are placed in the mouths of our patients by the present day specialists. I think we can safely pay them that compliment. The great thing we have to fear is, I may say, the ignorant use of orthodontic appliances by the every day practitioner.

This specialty is crowded with very skillful men; there are very few poor orthodontic specialists. I do think the general practitioner who is practising orthodontia and thinks he has every right to do so—as he has, for it is part of dentistry—is more likely to cause trouble by ill-fitting bands and orthodontic appliances and lack of prophylaxis.

There was another point that came to my mind relative to a case from a neighboring city, with the new Angle appliance in use, which, it is stated, can be applied and the specialist can control his case by seeing that patient possibly only once a month. Am I right in that, Dr. Young?

Dr. J. Lowe Young—Yes, sir.

Dr. Fisher—The case was sent for observation and prophylaxis. The case had not been seen for a month, and it was impossible for the patient to get back for another couple of weeks. I saw that case and may say it needed prophylaxis very

badly. We have had cases reported where it was said the patient only need be seen two or three times in six months. This I think is dangerous in that decay of teeth is liable to occur.

Dr. Green—It seems to me, whether we take the view of the orthodontist, or the general practitioner, that the operator must have the mind and eye and conscience at each step to guard against damage, and if there is damage, to repair it.

If a child is under the care of a dentist—whether a specialist or general practitioner—there is less danger of trouble occurring than otherwise. I had a case that did not have a single cavity in the two and a half years she was under my care; whereas her brother and sister, who did not have the attention, did have some cavities.

Whether the work is done by the dentist or the specialist, it is self-evident that it will be taken care of.

Dr. Ottolengui—Dr. Fisher tells us that a patient with an Angle appliance of the new type came into his office—that it had not been seen for some time by the specialist, and that the patient needed prophylaxis. How did he know she needed prophylaxis?

Dr. Fisher—How does Dr. Ottolengui know any case needs prophylaxis?

Dr. Ottolengui—If Dr. Fisher had said the teeth needed cleansing, I would not have had anything to say. Prophylaxis means preventing disease. Whether it be true, or not true, that clean teeth do not decay, it is not true that dirty teeth do decay. I believe with Dr. Young, that the children who are habitually in the care of orthodontists learn about mouth hygiene, and get the advantage of it, and they also get the advantage of something else—if there is one dread more than any other constantly before the orthodontist, it is the sudden blanching of the enamel. But he only needs see it once, and if he does, he knows that that patient needs prophylaxis. Uncleanly children may need to have their teeth cleaned, but they may not need prophylaxis.

Dr. Fisher—All right, Mr. Chairman, I apologize. The child needed the teeth cleaned.

Dr. Ottolengui—Dr. Clarence Grieves showed us where the danger would lie, that caries might be inaugurated at the points of contact of appliances and teeth simply because prophylaxis

could not be carried on. There is a discrimination to be made between prophylaxis and cleaning of teeth, and the orthodontist must make it. The children who are undergoing orthodontic treatment must have more careful attention than those children who are not receiving such treatment.

Many of you know that a great many years ago, I was rather posing as a specialist in the filling of children's teeth with gold; but the more orthodontic work I do, the less filling I have to do in my children's teeth.

Dr. Gillett—Dr. Ottolengui made a statement that the orthodontist has learned something about what dirty teeth do not do; but he should complete the statement by referring to what happens, from the standpoint of the general practitioner, to the other tissues about the teeth in the unclean mouth.

Dr. Ottolengui—I am not opposing cleansing of the teeth any more than I would oppose the morning bath; but I simply took exception to the expression used by my friend, Dr. Fisher.

Dr. Young—While it is unnecessary to see young patients more often than once a month in order to correct their malocclusion, I have found it to advantage in order to impress upon children the necessity of thorough mouth hygiene, to see them once in two weeks and in some cases once a week. I find that children have so many things to do, that they do not like to give up the time to come to the office, so I say to them, "If you keep your teeth clean and show me that you can, it will only be necessary for you to come to see me once a month, but if you do not you will have to come back in a week."

Dr. Dailey—During the transitional period of mixed dentures, the fact is often lost sight of, that in imperfectly shaped teeth, where the fissures have not closed by the proper coalescence of enamel, the food is apt to remain. We should sterilize those fissures, and by placing therein soft cement, we have a useful prophylactic measure.

Discussion of Dr. Getz's Paper.

Dr. W. D. Tracy—I have just had the pleasure of examining the models which have been passed around, and I am impressed by the ingenuity the operator has used in meeting the exigencies of this case.

There is a prevailing and, I think, a well founded prejudice against the use of clasps upon unprotected natural teeth, but with clasps constructed as these are and with proper and constant attention to oral hygiene on the part of the patient, I see no reason why this case should not be kept in good condition for an indefinite period.

In comparison with the prevailing methods of constructing removable partial dentures, this scheme as used by Dr. Getz permits a marked conservation of natural tooth structure which, of course, is an advantage if no damage comes to the teeth which support the clasps and built up masticating surfaces.

Granting that the patient will maintain the mouth in a condition of the greatest possible cleanliness, the case will probably be useful and efficient for many years.

The description of this case and the exhibition of these beautiful clinic models is a valuable contribution to the evening's work.

Dr. Getz—There is more to be seen from the models than I could say in the short paper. The patient is a young woman twenty-five years of age.

Discussion of Dr. Stillman's Paper.

Dr. Getz—I should like to say just a word in connection with what our worthy President has said. While those papers may have to some seemed out of place, it is a fact in religion as well as in the religion of dentistry, that while honesty and thoroughness and integrity of every kind have been preached from time immemorial, there seems to be as much need for them to-day as ever, as well in professional life as in anything else.

In regard to Dr. Stillman's paper, we essentially agree on the use of the tooth brush, but he did not mention anything about the use of a cleansing agent in connection with it.

Taking the powder in the palm of the hand and completely filling the bristles of a moistened brush in which the tufts of the bristles are not too close together, not only prevents the particles of dry powder from getting into the throat by inhalation, but also permits a larger quantity to be carried on the brush and also gives it the proper consistency when it comes in contact with

the saliva, to be most efficient mechanically as the operation of brushing brings it out of the bristles. There is another advantage in that it acts as a sort of lubricant and permits the use of stiffer bristles without a tearing and rasping effect on the gums. Without rinsing the mouth, a second brush full is applied in the same way.

My attention was drawn to the different conditions of the teeth and gums of patients who were equally consistent in the use of the brush and powder. One patient, intending to be very careful, put a little dry powder on the edge of the bristles, applied it and rinsed the mouth clean of powder, after each application, in order, as she said, "to get out all the germs," but was not getting the value of the powder. The paste and half-moist dentifrices soak and foam away much too readily to have a good mechanically cleansing effect on the tooth surfaces.

Dr. Luckey—I was very much interested in Dr. Stillman's paper; he briefly and concisely went over the proper cleansing of the teeth, the proper kind of brushes and the method of brushing. But nine times out of ten after the brush is used patients dry it by placing it in a mug or other receptacle without any treatment of the brush itself. It seems to me the patients should be instructed as to the importance of the care of the brush before and after cleansing the teeth. That is quite as important as the brushing of the teeth themselves.

Dr. Gillett—Dr. Stillman's paper is so timely and so effective, that I wish it might be distributed as a reprint, that each one of us might read at least once a week for the next year. It seems almost like being hypercritical to even suggest an addition to what Dr. Stillman has told us.

My own thought is to concentrate a little more on the brushing of the gums than Dr. Stillman has indicated. I think very likely he does so when talking to his patients. I believe we accomplish more for the good of the soft tissues than we do for the good of the teeth by our prophylactic efforts. We certainly get more noticeable results.

Dr. Stillman said he found the best method of instructing patients was by pantomime. In addition to pantomime and explanation, I take one of the brushes with which I am going to

supply them as part of that service, and brush their teeth for them as I want them to brush them themselves.

Dr. Chase, Jr.—I was very glad to hear Dr. Stillman speak of the small tooth brush. I remember at one time requesting a patient to bring to me the brush which she was using, because she could not keep her mouth clean; when she brought it I found it looked more like a nail brush. That is not exaggerated. It was enormous. It is very difficult to have patients buy the proper size brush and it is not an easy matter even to obtain the correct ones.

At one time I had some small tooth brushes made similar to the one Dr. Pickerel recommends in his book and they were very satisfactory. The small tooth brush is certainly more effective.

The patients can do more for their own mouths than we can, but if the brush is too large they cannot keep their mouths clean.

Dr. H. C. Croscup, Brooklyn—This paper has been of special interest to me, as I have the honor to be on the committee of the Second District Society in connection with public health and education, and I have the responsibility of organizing the lecture work in the Second District on Mouth Hygiene.

It is with some difficulty that I am able to cover all the lectures that are requested and required, and send the men that have the time to go and talk and be sure they are telling the right thing.

At those associations or clubs that I have talked to, I have given the method of using the tooth brush according to the suggestion of Dr. Fones, of the rotary motion on the outer surfaces of the teeth, which I think is particularly good. It not only reaches the gingival margins, but also brings the bristles between the interstices of the teeth, and dislodges what may be there.

On the biting surfaces, the long stroke can be used to advantage together with the rotary motion, and we try to impress the fact that the long sidewise or crosswise stroke is injurious.

My idea recently has been to prepare a talk or a lecture that can be followed by the entire staff of lecturers—we have in Brooklyn twenty or twenty-five on whom we can depend to give

these talks. Next Wednesday Dr. Hyatt and myself will talk to the Boy Scouts to try to impress on them the importance of mouth hygiene, and the district leader has reported there will probably be about two hundred boys there. There are a number of boys who have been instructed in the tooth brush drill, and we expect to have about half a dozen of them there to instruct the others who do not know about it.

In giving the instruction as to the cleansing and using of the brush, some men will tell them one thing and some of the other men will tell them something else. We want a unit of expression, and we should devise a plan which is scientific and on which we are all decided as being the right way, and then we all should use the same method. My idea in regard to the work over in Brooklyn was to prepare one of those lectures and send it to the various members of the First and Second District Societies, and have them revise, cut out, add to and edit the talk, so we can get at something that we can send to all these men who give these talks. If such a paper for instance were sent to possibly President Davenport, Dr. Gillett, Dr. Dunning and Dr. Ottolengui—by the time it came back there would be something to give to the public, we would know it was right, and it could be given to the members of the lecture staff.

The President—Some of those present may remember what the late Dr. Charles Miller so frequently said: "Brush the teeth as you would paint a picket fence," which always seemed to me to be very expressive and valuable.

Dr. Stillman's suggestion that the patients be directed to brush one tooth at a time seems excellent, because that is a terse expression and easily remembered. Sometimes I say to patients: "Remember the anatomy of the mouth and place your brush with thought, in accordance therewith."

Dr. Charles O. Kimball—I should like to add my slight word of tribute to Dr. Stillman's paper. Some years ago, I had occasion to prepare a small catechism on the "care of the teeth," outlining the proper procedure, and Dr. Stillman has followed the thought then brought forth, that the shape of the teeth is like the shape of the finger nail, and the brush that follows the curve with a circular motion accomplishes the purpose better

than if it were used crosswise or endwise. Insist also upon thorough rinsing to carry away debris, and the use of the silk where the tooth brush cannot go.

Dr. Stillman (closing)—I was asked to give a very short paper, so I was unable to include the amount of material I should have liked. I knew there were other papers to be read this evening and I wish to keep mine within the time allotted to me.

I should have been glad if the paper had brought out more opposition in the discussion, for it is a subject upon which there is great difference of opinion.

Dr. Getz said that I did not include tooth powders and dentifrice, and some person said that I did not mention rinsing the mouth. These are of course important points, but they were purposely omitted.

The subject of my paper was "The Tooth Brush, Its Application," not the broader subject, "Oral Prophylaxis."

Adjournment.

FREDERICK C. KEMPLE, D.D.S.,
Editor, First District Dental Society, S. N. Y.

FIRST DISTRICT DENTAL SOCIETY OF THE STATE OF NEW YORK

A regular meeting of the First District Dental Society, State of New York, was held at the Academy of Medicine, 17 West Forty-third Street, New York City, on Monday evening, January 4, 1915.

The President, Dr. S. E. Davenport, occupied the chair, and called the meeting to order.

Preceding the paper of the evening, a brief time was given to "Communications on Theory and Practice." Then followed a paper by Dr. William Carr, of New York, entitled "Epulis."¹

Communications on Theory and Practice.

Dr. Henry W. Gillett—Judging from some conversation I have recently been hearing, the use of the Buckley desensitizing paste is at the present moment a lively subject, and it has occurred to me since receiving the notice of this meeting that a word of warning concerning one element of possible risk, may be worth while.

I have no opinion to express as to whether the Buckley paste is to be a successful or an unsuccessful method for us in the overcoming of one of our difficulties. I do not think the time has yet arrived for that expression; but there is a possible suggestion to be made. I have not gone far enough in experimentation with it to know whether it is worth while or not; but Dr. Buckley mentioned in his report to us in Brooklyn that one man was using the paste by sealing it in and applying heat immediately, without waiting some days to get the result. Possibly we may be able to get the same results with dry paraform powder sealed in and heated. I have made some tentative experiments, but have as yet no report to offer.

Some of my friends feel that all these efforts at desensitizing and anesthetizing the pulp of a tooth are mistakes—that they are too full of risks, and deprive the operator of an index as to how his work is progressing, as marked by the sensations

¹ See Dr. Carr's paper in full at p. 6 of this number of THE JOURNAL.

of the patient. I do not feel quite that way about it myself, and I want to refer to this one particular point—namely, that reports concerning the death of pulps from this treatment are sure to come—not necessarily because of any defect in the theory that Dr. Buckley has advanced, or because of any defect in the process, but because of the same type of carelessness that helped to deprive us of the possible usefulness of cataphoresis. Those of you who remember that procedure will recall that there were many reports of death of the pulp. It is the opinion of some of the men best qualified to express an opinion, that many of those pulp deaths occurred at the hands of men who did not use the milliammeter, and so had no warning of the fact that they were using enough current to cause electrolysis of the nerves and blood vessels at the apical foramen. There was another even more frequent cause, which I have rarely seen mentioned, and which is going to be operative with any application or process for attaining the same end. It is undoubtedly already operative in the use of the Buckley paste. The procedure with a large proportion of our operators when they have desensitized entirely the dentin of the tooth, the whole tooth, or have induced conductive anesthesia or analgesia, is to see how *quickly* they can prepare the cavity. It does not seem to occur to them that they can do harm, if they do not cause pain, and in their haste they develop enough heat to bake the pulp right where it stands. A great many deaths of the pulp happened in that way, accompanying the otherwise successful use of cataphoresis, and a great many more will undoubtedly happen in that way at the hands of careless users of the Buckley paste. When using any process for eliminating pain and involving a tooth in which you wish to retain the life of the pulp, you will do well to remember that it is necessary to proceed with great caution, because you have eliminated one of your danger signals; and just so surely as you prepare your cavity too quickly with the engine bur, just so surely will you bake the pulps in a large proportion of those cases.

Dr. William D. Tracy—I think Dr. Gillett's points are well taken. It seems strange that with such an interesting subject there are not more men who are ready to say something. Of

course, this subject is rather new; but it is wise to exchange opinions. My feelings on the use of the paste were based on the confidence I have in Dr. Buckley, and when he came forward with something that seemed like a panacea, it was not surprising that the dentists should be ready to take it up.

Dr. Buckley told me in Brooklyn that he had been experimenting for five years with this desensitizing formula in various degrees of strength, and the formula he handed to us in Brooklyn that night he had used for eighteen months, and it had been in the hands of several of Chicago's most prominent practitioners; and he asserted, if properly used, it would not kill the dental pulp.

That gave us great confidence, and my experiences have been very interesting, and have made me feel very hopeful; but recently we have heard a number of members of this society, whose opinions we value, say, that a certain number of pulps have died. Now that may not be due to the paste; those pulps might have died in any event. If it is possible to kill a pulp by the application of the paste in dentin which is not particularly carious, we must go slowly.

A member told me he had used the Buckley paste to devitalize freshly exposed pulps, where he had voluntarily exposed them, and at a subsequent sitting had found the pulp free from blood supply and in a semi-hard condition; and, recognizing that formalin is the agent which does the work of desensitization, it is not strange that that the paste should have this effect on soft, albuminous tissue.

Of course, in desensitizing sensitive tissue on eroded surfaces we have used the 40 per cent. solution of formalin. It hardens the albuminous contents of the tubuli and renders them free from sensation, and I presume that it is self-limited—that in microscopic tubuli the sensation would be limited according to the calibre of the tubuli themselves.

I feel we should go cautiously, and I would be glad to hear the statements of other men.

I had one case particularly, of a patient who complained afterward of facial neuralgia, where I had used the paste in a very small cavity in a buccal surface. It was very tender, and,

in my compassion for the patient, I said: "We will use this new Buckley paste, and leave it in twenty-four or forty-eight hours." I did so, and at a subsequent sitting I put in a filling. Everything was lovely—and then the patient complained of neuralgia. This patient is a neuralgic patient, and has had periodic attacks; but she claimed it was due to the Buckley paste. Perhaps if I had not told her about the paste, she would not have attributed her pain to the use of it.

Dr. William B. Dunning—I am very cautious in using the Buckley paste, although perhaps not quite as cautious as I reported at the Second District meeting. Instead of sealing it in, it is often sufficient to place the material at the bottom of the cavity, and cover it with warm gutta percha, and hold it down for a minute or so with a broad warmed instrument. The heat accelerates the action of the drug, and you do not take the risk—if it is a risk—of sealing the material in until a later sitting.

Dr. Herbert L. Wheeler—I might make one suggestion in regard to the Buckley paste. I have had some experience, which I will not tell you now, but I am not using it much at present. However, I find that when it causes extraordinary pain and neuralgia, that the prompt use of chloroform to clean out the cavity will be a great help.

Dr. Herman E. S. Chayes—I used the Buckley paste long before Dr. Buckley came East with it, and I have yet to see a place where it caused excruciating pain—or even pain that could be called pain—and I believe it is due to the care in using it—the use of the rubber dam, placing the paste in the cavity and placing a bit of cotton on it without undue pressure, and the proper sealing of the cavity with cement. If you can properly do that, it will desensitize your cavity. If the cavity is exceedingly deep and approaches the pulp, that is no place for the Buckley paste; it is a place for extirpation of the pulp.

We always expect more from these things than they are meant to give us, and if we stick closely to what Dr. Buckley advises, we will have no disappointments.

I think I have used it since Dr. Buckley was here in about thirty cases. I have had to apply it twice in some cases, but I have had no failures. The greater the amount of normal tissue,

the more slowly will the paste work. The greater the amount of decay, the greater the amount of disorganization of dentin—the quicker will you get action. You must remember the structure of the pulp. The too rapid heating of a tooth is under all circumstances to be condemned, whether we use Buckley's paste, or nitrous oxide and oxygen, or any anesthesia. It is our own carelessness, nine times out of ten, that gets us into trouble; and if we will be as careful with the Buckley paste in patients' mouths as we would like dentists to be with our own teeth, without the Buckley paste, I think we will not have any trouble.

Dr. Nelson T. Shields—I find from long clinical experience that if we take the pains just stated—properly applying the rubber dam, and being very careful, and applying the warm air, we have no need for desensitizing agents. Never use a bur twice. Sharp excavators and careful manipulation will in my hands invariably produce a proper result without pain.

Discussion on Dr. Carr's Paper.

Dr. Carr—Last summer a case of epithelioma was referred to me by an out-of-town fellow practitioner. He had been treating the tumor for an abscess, having made a deep incision and packed it for several weeks with iodoform gauze. As the tumor kept enlarging, he felt that he needed advice. When it came under my observation, the tumor had increased to such an extent that the eye was bulging, and I decided that it was an inoperative case. I advised that the patient should go to a hospital, which he did—dying there within three weeks. This is a striking illustration of the danger in treating such cases without having made a proper diagnosis.

Henry H. Janeway, M.D.—I wish first to express my appreciation at being asked to discuss this paper; and, secondly, my thanks to Dr. Carr, for I feel I have learned a great deal by coming here. His paper has been a very interesting and instructive one. It indicates a study of surgical conditions in the mouth, which I did not appreciate as coming from oral surgical clinics. It indicates an attempt on his part to diffuse knowledge of surgical conditions within the mouth, which has not been entirely appreciated by the general surgeon as emanating from dental societies.

The main feature of Dr. Carr's paper seems to me to emphasize the conservative treatment of these epulides. I wish to express an entire agreement with his position. I think the older method of treatment—the removing of several teeth and the whole of the follicle, although unquestionably curing these cases, is entirely too radical. A less radical treatment is indicated.

These tumors should be classified in the class of sarcomata. Their microscopical appearance is characteristic. They all possess large numbers of giant cells, which are characteristic of myeloid sarcomata in general. The elements which are seen through these cells are characteristic of spindle cell sarcomata. They are closely related to the strict myelogenous sarcomata.

The desirability of conservative treatment in this group of tumors is beginning to be recognized by the general surgeon when such growths are met with in other parts of the body besides the jaws. It is even possible to cure them by curetting, and yet they are rightly classed as sarcomata. There is a strong feeling among surgeons that because a patient has a sarcoma of the leg, for instance, it is not necessary to amputate the leg; and the majority of surgeons to-day are emphasizing the importance of conservative treatment in this class of cases.

It is very interesting to note the agreement between the general surgeon and the dental surgeon upon this point—that they are both attacking the same problem from different sources, and are recognizing the necessity of a more conservative treatment of these cases.

There has recently appeared a paper, which was published in the last *Journal of the American Medical Association*, by Dr. Ivy, of Philadelphia, who works with Dr. Cryer. He deplors the fact that these cases are called sarcomata at all. I cannot agree with that view, and I agree with Dr. Carr that we should call them by their proper name, which is sarcomata; but we know there are as many different types of sarcomata as there are different types of dogs. Some of them may be very innocent, and others very destructive and malignant.

I am sure these tumors do not change their character. If the patient has been subjected to treatment, and there is a recurrence, we may be sure there is no change in the character of the

growth, and it will remain benign, even after a recurrence takes place.

I never forget the anxiety with which a patient came to me, who was referred to me from Kentucky. She had one of these tumors in her mouth—and this one, by the way, was on the lower jaw, and situated as far back as the canine tooth. She brought with her from her pathologist in Kentucky a written diagnosis of sarcoma—a malignant tumor—and she was advised to have a resection of the jaw. I immediately recognized the benign character. You can always spot them—you cannot mistake them for anything else. The typical giant cells are present with the spindle shape cells distributed through them.

If I had had Dr. Carr's experience before me at that time. I would have used the cautery; but I subjected the patient to a little greater trauma in using the chisel, and there was a good recovery.

She had come to New York with the idea that she was a doomed woman.

Eugene H. Pool, M.D.—There is nothing, I think, of a practical nature that can be added to the excellent summary of the subject of epulides which we have heard this evening.

Clinically, as has been said, this variety of neoplasm presents itself as a circumscribed tumor connected with one of the alveolar arches. It is covered with normal mucous membrane, and causes no subjective symptoms other than those produced mechanically by its presence.

Histologically, the interior of the growth presents connective tissue elements; there is present a variable number of giant cells. In structure, an epulis may be practically identical with another form of tumor—namely, giant celled sarcoma (sometimes wrongly called myeloma), which occurs in the marrow of the long bones. Therefore from a histological standpoint an epulis cannot be said to be unique. A feature of this tumor, which is worthy of consideration, is that it is classified with the sarcomata—a term which to many minds suggests malignancy. Yet an epulis is distinctly a benign growth. I must disagree with the previous speaker, for I believe it is unfortunate and confusing that the epulides should be classified under a term which is generally supposed to imply malignancy.

In regard to treatment of epulides, there can be no argument in regard to the advisability for their removal, nor any argument that the surgeon should endeavor to guard against recurrence. Every one will admit that an epulis should be removed with the least possible disfigurement of the patient and the minimal sacrifice of healthy teeth. It is, moreover, universally admitted that the periosteum at the attachment of the stalk or pedicle of this pedunculated neoplasm should be removed. The only subject for argument, then, is the question as to how to remove this periosteal attachment.

It has always been taught that a small lamella of bone should be removed with the periosteum at the attachment of the pedicle.

Yet I have been very much impressed by what Dr. Carr has said in regard to the destruction of the periosteal attachment by the cautery. But it must be remembered that the adjacent tooth is not infrequently carious and may be beyond saving, in which case the removal of a lamella should certainly be elected.

I am not prepared to pass on the question, because you have had more experience in this connection than I; but if one can surely remove the attachment by cautery, disfigurement of the patient by the removal of teeth should be avoided.

I was impressed by the emphasis which Dr. Carr placed on the absolute necessity for early differentiation between benign and malignant tumors. Only by such early recognition of the character of a tumor can we avoid the dire results of malignant growths. The responsibility for that early recognition is often up to the dentists who are frequently first consulted by patients having tumors of the mouth. In this connection I wish to emphasize that there is no method of treatment, except early radical removal, which will cure malignant growths that occur in the mouth and I do not except the x-ray, or radium, or anything else. We must recognize that all these methods of treatments have yet to be proved efficient. In such malignant growths we must depend upon early diagnosis and early radical operation to effect cures.

Dr. Morris I. Schamberg—An opportunity for the discussion of a surgical topic before the main body of this society so rarely

presents that I am particularly glad to be here this evening to discuss this paper.

You have doubtless been impressed by the essayist and the speakers who have discussed the paper that there is urgent need for the early recognition of growths about the mouth. I would much prefer to refer to growths about the mouth as "growths." than by the use of the term "epulis" because the term epulis has carried with it for many years the idea among dental practitioners that the condition is necessarily a benign growth.

It is rather timely that the dental profession should lay stress upon the need for more conservative methods in the treatment of the giant cell variety of sarcomata that occur about the mouth; but I am not prepared to accept quite the conservative treatment that my friend Dr. Carr advocates.

I usually remove the teeth involved in and about the sarcomatous growths even though they be often of the benign order for I usually find the growth firmly attached to the periodental membrane. It has been stated that giant cell sarcomata occur in relation with retained ligatures, foreign substances, etc., in other words, in regions that are subjected to irritation, so we must come to the conclusion—and Dr. Bloodgood is a firm believer in the fact—that giant cell sarcomata are largely inflammatory *in origin*, if not inflammatory lesions, *per se*.

Therefore if we propose to save the very teeth that have caused the trouble, we are not getting at the bottom of the disease.

I fully agree with Dr. Carr that in dealing with the pedunculated variety it is possible to remove the growth at its very origin with the cautery; but the large majority of these cases are not the type that have distinct pedicles.

The pedunculated growths are seldom of the soft variety but are usually made up largely of fibrous tissue. I have seen such soft pedicles spring from the inside of the cheek and these growths are easy of removal. When they exceptionally occur at the gum margin, this same treatment may apply, but as a rule we find the giant cell sarcomata spring from the periosteum and in some instances I have seen them attached to the periodental membrane.

I am inclined to be more conservative in my removal of such growths than the general surgeon. Most surgeons to-day realize that these giant cell sarcomata need not be subjected to the extensive operations that have been done in the past.

Malignant growths usually recur in spite of extensive removal. This fact calls our attention to the point brought out by the essayist and by the gentlemen who were kind enough to discuss the paper, that the most important thing is to recognize the type of the growth early, not to temporize with it; and no matter how benign the growth may appear to be you must make a microscopic study of it.

I must admit that I am not sufficiently familiar with growths to tell them without microscopic examination. I must in every instance see the condition under the microscope to determine its true nature. I am usually fully convinced in the more advanced cases what I am dealing with before I take a section. The sectioning of these growths by men who are prepared to study them is not harmful; but to temporize and cauterize and try various forms of treatment to lead the patient to an easy recovery is a mistake. Oftimes you lead them to the grave.

A case that came to my attention within the past six months was one that had gone from pillar to post, and had received the advice of many men; yet the condition was not recognized, and when a section was made, it was found to be as I suspected, a typical carcinoma of the jaw which had destroyed the jaw from the chin to the articulation and had even gone to the opposite side. The patient, a short time afterwards, succumbed to the dreaded disease.

I could refer to many cases less extensive than this one; but the essential points are first, a less radical operation for the giant cell sarcoma than the general surgeon has been using, and a little more radical than the dental surgeon has been performing—and a more rapid recognition of the case at hand.

Dr. Nelson T. Shields—I just have a few words to say endorsing Dr. Carr's paper. It has been my practice to treat cases of epulis in the way described by Dr. Carr. Many cases involve the maxillary sinus, and to extract more teeth than cause the irritation is generally excessive mutilation. Moderate

curettling after cause has been removed with antiseptic treatment, will promptly cure.

I could entertain you with many cases operated on by some of our foremost surgeons, and cases where the patients were told they were now going to lose half of their jaws—as if it were a treat.

In one case Dr. D—— wrote a letter requesting us to think out a plan to restore his face, that he was about to have his superior left maxilla removed. I telegraphed him if operation had not been performed to return to New York, but it was too late. The doctor now has his face restored. The whole upper left maxilla was removed except the molar portion, and in my estimation his condition is most pitiable.

Another case was a sarcoma around the left inferior wisdom tooth. There was some irritation there, and the best surgeon I could get at that time advised the immediate removal of half that jaw after making a microscopical test resulting in giant cell sarcoma. I took her to the surgeon I was in the habit of working with, six weeks later, and the removal of that tooth and curettling has prevented the recurrence of that trouble. This was twenty years ago.

I commend Dr. Carr's treatment, and I most heartily deplore extensive operations before minor operations are at least tried.

Dr. Pool—I cannot refrain from saying this: that the teaching we have just heard is very dangerous teaching. The first case the doctor spoke of, where a large amount of the face had been removed by a prominent surgeon, was evidently a true case of sarcoma. It is better for that man to have half a face, than to be dead, and I am convinced he would have been dead if that operation had not been performed.

I think the teaching of a minor operation before a radical operation, in cases where a radical operation is indicated, will result in the patient's death. If a case is benign, and you find out it is benign, you are justified in doing conservative work; but you must find out whether it is benign, and if it is not, you must have a radical operation for the removal of the malignant growth.

Dr. Shields—To a young physician I stated the cure of a sarcoma from a dental standpoint after showing him Dr. D's mouth; and his remark was: "Dr. Shields, if I ever had a sarcoma in my mouth, I should never come to you for treatment." After he had consulted four eminent surgeons about the treatment of sarcoma, he reversed his statement, saying that he would come to me for treatment. All four of the surgeons had stated that a minor operation should be resorted to before a major operation was undertaken.

Dr. Carr—(*in closing*) I am very much gratified with the discussion of this subject. As mentioned by the first speaker, and also by Dr. Schamberg, I believe that in all cases where there is a doubt as to the character of a tumor, a microscopical examination should be made before a radical operation.

In the case mentioned by Dr. Shields, I think that he did not understand its true nature. I doubt whether a surgeon would undertake such an extensive operation, unless convinced by a microscopical examination, that the tumor was malignant.

The President—The members of this organization join me in giving our best thanks to Dr. Janeway and Dr. Pool for serving us as they have this evening.

Adjournment.

FREDERICK C. KEMPLE, D.D.S.,
Editor, First District Dental Society.

BOSTON AND TUFTS DENTAL ALUMNI ASSOCIATION

Feb. 10, 1915.

The February meeting of the Boston and Tufts Dental Alumni Association was held at Hotel Bellevue, Boston, Wednesday evening, February 10. There was a large attendance and all who were there well repaid for coming.

The business meeting was called to order by President Taylor at 6:30; various items of business were disposed of and committee reports received. Action was taken on same. Dr. Johnson reported the serious illness of Dr. F. M. Hemingway, formerly an instructor at the Dental School. All next adjourned to the Banquet Hall, where an enjoyable dinner was served.

The speaker of the evening was then called upon—Dr. H. H. Germain, Professor of Anatomy at the Tufts Medical and Dental Schools. Dr. Germain's topic was "Tumors of the Mouth," and he handled the subject in his usual finished and proficient manner. He illustrated his difficult and important topic by means of pictures and actual specimens from operations performed. There was no formal discussion of the paper, but various members familiar with the work were called upon to make a few remarks. This informal discussion proved of interest and value as many unusual cases were commented upon.

The executive board wishes to make the announcement that at the next meeting of the Society, April 14, we shall have as our guest, Dr. H. C. Bumpus, the newly appointed President of Tufts College. This will be a meeting of special interest and we hope to have a large attendance. A more complete notice will be sent to each member later.

A. G. RICHBURG, D.M.D.,
Editor, Boston and Tufts Dental Alumni Ass'n.

THE JOURNAL OF THE ALLIED DENTAL SOCIETIES

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VOL. X

NEW YORK, MARCH, 1915

No. 1

EDITORIAL DEPARTMENT

NEW STANDARDS AND OLD

Not many years ago the public drinking cup, the common milk can, the unquestioned oyster, were articles of established utility and repute in the most discriminating community. Those were the golden days when most human ills might be referred to an inscrutable Providence, and man was permitted to suffer his self-inflicted troubles with a clean con-

science. A contrariwise disposition, however, has since impelled him to "investigate" many former conveniences and comforts, with the result of finding that he must forego or "regulate" them—under penalty of having only himself to blame for consequences. This leaves him perhaps not happier, but wiser, and, barring accidents, likely to live the longer.

Frequently we have pleaded the importance of remembering what is good in the old before making radical change for what is new. It is so easy to forget the hard lessons of experience in the enthusiasm which warms a new idea. But it is even more important to see the good—the really good—in the new, in a world which must progress. True progress is like ascending a winding stair in a tower: at each window we see the same picture, but wider and forever different, because we see so much the farther. The same elements exist—but the new horizon brings a new adjustment of proportions: we cannot see them as at first, except by shutting our eyes to the light.

Among recent changes in operative dentistry, that of improved root canal work is undoubtedly the most important. It is a truism to say a tooth is no better than its root. And now we know that a diseased root not only means a painful and useless organ, but a menace to the general health of the patient of so serious a nature as to require prompt cure or removal in all cases. The "comfortable" chronic abscess of old is a potent factor in the causation of many acute systemic

troubles, and in organic injuries leading to premature senility. It must be eradicated; and, as extraction means a serious loss in most cases, successful root work becomes of commanding importance.

No operator, however skillful, can do correct root work without the roentgenogram: the best of operators are being daily amazed and humiliated with this truth, in inspecting their old work by this means. Knowledge, instead of surmise, concerning the length and shape of roots, is essential in this work, and the X-ray is the only means available.

The old dread of "going through" at the apical foramen must be supplanted by the determination on the part of the operator to do exactly that in all cases. Anything short of reaching healthy periapical tissue implies leaving a zone of dead material of greater or less thickness at the root end, which may at any time of lowered resistance on the part of the patient recruit a bacterial army of invasion. The cleansing of the canal to its ultimate end is necessary, and this means aseptic instrumentation and the aseptic filling of that canal. The sterile gutta percha filling, penetrating and "encapsulating" the apex, advocated by Rhein, seems the most dependable method available at this time.

The metallic sodium and potassium paste is far safer than sulfuric acid as a means of tracing and opening obliterated canals. This paste attacks only the organic matrix of the dentin, and by its destruction and re-

moval the way is cleared for the broach, whereas the acid method involves the dissolution of the inorganic as well as organic constituents, with the frequent result that a "false pocket," once formed, is easily carried to a perforation at the side of the root.

Where it is mechanically impossible to cleanse a crooked canal, amputation of the unfilled end is the surest means of safety. Where this is impracticable, thorough sterilization of dentin by ionism may prevent future septic conditions; but of this there cannot be certainty. Ionism is an excellent final precaution in all root canal work, but should not take the place of perfect filling.

We have not reached perfection in technique, but we have learnt the necessity of thorough root work, and its feasibility, though tedious and difficult. In the light of present knowledge, we must meet the new and heavy responsibility which rests upon every dental practitioner.

OUR PIONEERS

THE JOURNAL, in this issue, has the melancholy but honorable duty of noting the passing and of recording the lives and distinguished services of John Morgan Howe, James Truman and Louis Jack. These men were leaders in thought and action through the half century period in which dental science and art emerged from the narrow limitations of artizanship to the broad usefulness and dignity of a great profes-

sion. They advanced our knowledge, our aspirations and ideals. Out of many and varied works their influence in dental literature stands as perhaps the most conspicuous element. Dr. Howe was an enthusiastic champion of professional journalism, and an active promotor of this journal, from its first issue until his death. Dr. Jack was a conspicuous figure in the management of *The International Dental Journal*. In this field Dr. Truman must stand always pre-eminent as the veteran Editor. Under his strong guidance *The International Dental Journal* stood for the best in dentistry for about sixteen years. The event showed that he worked ahead of his time.

We for whom they labored so unselfishly, honor the memories of these men of vision at this sad time of their passing away.

NOTES ON PRACTICE

COMPILED BY WILLIAM D. TRACY, D.D.S.

Carbolic Acid.—When carbolic acid is used for sterilizing or obtunding dentin, alcohol should not be used to dry out the cavity. Alcohol and carbolic are incompatible and the action of the latter is neutralized in such cases. Chloroform should be used in place of alcohol.—F. W. P.

How to Protect Gold Work from Amalgamation.—Before inserting an amalgam filling in a mouth containing gold, especially if the amalgam is in close proximity to a gold filling or crown, dry the gold work and cover it with a coat of sandarach varnish.—A. F. DANAHOWER, *Dental Cosmos*.

Temporary Stopping for Cavities.—In a sensitive cavity a temporary stopping can be inserted most comfortably by sticking a piece of stopping to the end of a broad, flat burnisher. Then wipe the cavity as dry as possible with a pledget of absorbent cotton, and after heating the gutta-percha over the flame, plunge it into a bottle of oil of cajaput and force it into the cavity. The gutta-percha in this way is cooled, thereby avoiding any shock to the sensitive tooth, and the oil having no affinity for moisture, forces the remaining moisture out of the cavity, and the gutta-percha adheres to the tooth. This is a valuable aid in treating deciduous teeth.—C. F. ASH, *Odontologist*.

To Improve the Color of Pink Rubber.—Take a piece of absorbent cotton, saturate it with sulfuric acid, and rub it over the prosthetic rubber piece until it is black. Wash off every trace of the acid. The resulting color is a perfect imitation of the natural gums.—*Le Laboratoire et le Progres Dentaire (Dental Cosmos)*.

Preservation of Tincture of Iodin.—To prevent the formation of acid in alcoholic solutions of iodine, the addition of two parts of borax to one part of iodine is recommended. This admixture will even counteract any acid that has already formed. This acid has a very detrimental action on tissues painted with tincture of iodine, often resulting in painful desquamation and excoriation.—*Le Laboratoire et le Progres Dentaire (Dental Cosmos)*.

Paraffin Bath for Carborundum Stones.—Carborundum stones will run truer and whirl up much less dust in dry grinding if they are soaked in melted paraffin for a few minutes. After the paraffin bath take the stones out and lay them on paper. The paper will absorb the surplus, and the stones will not be "sleazy" and disagreeable to the touch. With a stone treated in this manner one can grind a facing or artificial tooth without being compelled to inhale half of the porcelain removed. To be sure, a stone treated in this manner cannot be heated to red heat, but the paraffin bath puts it in excellent condition for effective disinfection with some liquid.—*Articulator (Dental Cosmos)*.

Adenoids.—This disease has apparently increased in frequency with prodigious rapidity in recent years, and its increase seems to have been concomitant with the habit of keeping windows open night and day in summer and winter. Moreover, observations seem to indicate that the proportion of children affected with adenoids is distinctly greater among the more educated classes who are most scrupulously insistent on keeping their windows open at night throughout the year. Children brought up with open windows appear, indeed, to be about fifteen times more likely to contract adenoids than those who sleep with the windows shut on cold or damp nights, or they seem at least more prone to adenoids than those who sleep with closed windows throughout the greater part of the year. The few figures obtained thus far are as follows: Among 69 children who slept with closed windows, two cases of adenoids were found, while among 49 who slept with open windows at night in winter and summer, 22 cases of adenoids were found. It will be seen from the above that adenoids appear to be confined almost entirely to those children who sleep with open windows; but, notwithstanding this, the other contributing factors must not be overlooked, such as clothing, perspiration, digestion, and the development of the palatal arch. It would probably be more satisfactory, therefore, if in further statistics the relative frequency of adenoids were considered class by class, since conditions, such as housing, heating, clothing, etc., may be essentially different.—J. S. WALLACE, *Dental Record*.

Root-canal Filling for Deciduous Teeth.—We find it almost impossible to dry the root-canals thoroughly. It becomes, therefore, necessary to use a material that will adhere to moist surfaces. Dr. Henry C. Ferris, of New York, suggests a filling material which meets the requirements of a good root-canal filling material in deciduous teeth. The formula he uses is:

Isinglass, 3i

Tannic acid, grs. iss

Tricresol, ℥iv

Aqua destillata, 3ifs.

The mixture is heated to 100° in a water bath. It becomes syrup-like, and can be introduced into roots and covered with cement or gutta-percha.—S. G. WALTON, *Items of Interest*.

Hints for General Practice.—Try trichloroacetic acid in 50 per cent. solution for melting away the gum overlying third molars, preventing it from getting into the throat or upon the cheek by the use of cottonoid rolls. If the flap is large enough, inject cocain and cut it away, thereby materially relieving the pain.

A little beeswax and resin will prevent the engine cord from slipping.

In Chicago at a recent meeting, Dr. Keefe demonstrated that any pain arising from the fifth nerve could be temporarily stopped by making two or three injections of equal parts of water and alcohol into the

nostrils by means of a watch-case atomizer. The pain would disappear in from ten to fifteen seconds.

A free application of campho-phenique after setting a crown will relieve the pain.

In repairing plates dry, pack with vulcanizable gutta-percha and save time and trouble.

In syringing the mouth do not interfere with the muscles and the water will not run out at the corners.

Remember that oil of cassia will discolor the teeth and that you do not need it in the office at all.

For supporting a sore tooth while drilling, make a splint of modeling compound for both the buccal and lingual sides. This will hold the tooth firmly and prevent pain from the jar of the bur.

Extracting and replanting often cures an abscess where all other means have failed.

The sodium dioxid used for bleaching purposes must be pure; there are well known tests to determine the purity of the drug.

Ebullition is the best method for sterilizing instruments. Add 5 per cent. sodium carbonate to the water to prevent rust.

For the putrescent pulp, Buckley's formalin and tricresol, equal parts, is a most efficient remedy.

Lactic acid cleans the saliva tube. The injection of a 20 per cent. solution of argyrol will clean pyorrheal pus pockets.—W. E. TENNANT, *Dental Review*.

CURRENT DENTAL LITERATURE

COMPILED BY C. WILLIAM RUBSAM, D.D.S.

MOUTH INFECTION AS A SOURCE OF SYSTEMIC DISEASE. From symposium on Mouth Infection by Drs. Billings, Mayo and Rosenow, read before Section on Stomatology, American Medical Association, Atlantic City, June 24, 1914.

Without a doubt the findings that systemic conditions may be traced back to mouth infections will mark an epoch in the history of our profession. Dr. Billings insists that the radiographic examination of the teeth and jaws is imperative, as by no other means may we know the exact conditions of the alveoli and the roots of teeth. Alveolar infection and abscesses may be primary and due to unhygienic mouth conditions, and are often intensified and prolonged by irrational dentistry—teeth with infected pulps bearing crowns or imperfect root fillings. Whether primary or secondary, alveolar focal infections may be the dominant factors in the production of systemic disease, of which malignant endocarditis (*streptococcus viridans*), chronic anthritis and myositis are examples. From the infected alveoli and tooth canals, cultures have been made, yielding principally the *streptococcus-pneumococcus* group. Dr. Mayo states that germ life in the blood is now known to be associated with all infectious diseases. Pyorrhea, tonsilitis or sinus disease may be the source of an infection called rheumatism. Root abscesses and pus pockets connected with them are often the source of acute and chronic rheumatism. Certainly, enough is known concerning infections and their mode of entrance, that the infected and diseased mouth and respiratory tract must be looked upon as most serious menaces. Dr. Rosenow asserts that the most common location of various infective foci is in the head. He points out that vaccine treatments of tissue lesions have failed in the past because the strain used for culture in the lesion may have changed from the original strain found in the focus. Thus, it is useless to treat systemic conditions with vaccines unless the dental foci are eliminated, if any are present. He says that the argument that infections in the mouth are so common in individuals in apparent good health does not minimize their importance. These or other foci are so common in patients suffering from arthritis, neuritis, appendicitis, ulcer of the stomach and goiter, and so rare in individuals who have had superb health for years, that their direct etiologic role can scarcely be questioned.

FRACTURES OF THE INFERIOR MAXILLA. By Henry S. Dunning, M.D., D.D.S., New York.—*American Medical Association Proc.*, Vol. LXIV., January 9, 1915.

The essayist's article is based upon extensive observations embracing 1065 case records. This large number enables him to give accurate classifications both as to the cause and location of mandibular fractures.

To quote from him, "the inferior maxillary bone on account of its position and shape is the most frequently fractured bone of the face and about tenth on the list of all bones of the body to be fractured. About 98 per cent. of all fractures of the body of the bone are compounded when there are teeth present. And thus it is the most frequent bone to suffer a compound fracture. The fracture of this bone becomes infected on account of the fractures being compound, more than any other bone. The patient suffers great pain, injury to the inferior dental nerve and also from the inability to swallow, eat, drink and cough.

"The fracture is about ten times as common in man as in woman. The most common age for the fracture of the bone is between 30 and 40. The most frequent cause of the fracture is a blow of the naked fist. A fracture is most often at the region of the bicuspid on the left side. Fractures of the lower jaw depend a great deal on the occlusion of the upper and lower teeth. Fractures of the condyles are rare, but are often followed by bony ankylosis. Fractures of the coronoid process are extremely rare and occur only when the zygomatic arch and the side of the face are severely crushed. Great care should be exercised in keeping the mouth clean in the treatment of fractures of the jaw. A cap splint or single arch splint should be used whenever there are one or more strong teeth on either side of the line of fracture to which the splint may be cemented. The interdental splint or intermaxillary splint should be used only in children, in edentulous mouths and in fractures posterior to the third molar when the upper and lower jaws cannot be wired together by means of Angle's wires and bands.

"The open operation or surgical wiring of the fractured ends of the bone is unnecessary and generally results in infection and necrosis. The inferior maxillary bone can be more accurately reduced and held in better coaptation than other bones, as direct force can be applied to it by means of appliances attached to the teeth. Non-union very rarely occurs and is generally due to faulty or delayed treatment.

"A roentgenogram should always be taken to ascertain the line of fracture, to discover the presence of impacted teeth and to note any infections or abscess conditions at the apices of the teeth near the point of fracture."

PERIDONTAL INFECTION AS A CAUSATIVE FACTOR IN NERVOUS DISEASES.

By C. B. Craig, M.D.—*Journal of the American Medical Association*, December, 1914.

The presence of pus in a body cavity has long been considered a finding of the utmost importance, or even grave significance, to which an almost innumerable number of symptoms may be attributed. Until recently the existence of pus around the teeth has been lightly regarded and often rejected as a possible cause of serious systemic disorder. The results of periodontal infection would certainly be more disastrous were it not for two fortunate factors of safety, the one, anatomic; the other,

physiologic. The former is that the pus usually has free drainage into the mouth. The latter factor is the establishment by the body tissues of various degrees of immunity against a continuous bacterial intoxication, for example, from the bacillus coli communis. Just as the colon bacillus sometimes overpowers the individual's resistance and produces a general intoxication, a localized collection of pus or septicemia, so may the bacterial flora of the mouth subdue the body resistance. The essayist suggests that since a purulent process in the urethra or tonsil is considered ample source for any arthritis, neuritis or endocarditis, why are we not justified in considering a septic condition around the teeth as a source of various disturbed states of health, when no other cause exists. His argument is reasonable when he follows up by saying that alleviation of the general symptoms promptly follows the interference with the local septic oral conditions. Peridental infection is by no means limited to the clinic patient, but is often found in the mouths of those who have taken the utmost care of their teeth. In these cases, the dental work has been faulty and the real status is only revealed by a roentgenogram of the area. For a considerable period it has been observed that a bad condition of the teeth may be responsible for adjacent disorders, such as otalgia and tic douloureux, but the observation that stubborn neuritis of the sciatic or other nerve trunk or of the brachial plexus sometimes disappears after cleaning out the alveolar disease is of comparatively recent date. It seems a far cry from mouth infection to mental disease, but when one witnesses profound depression clear up following the drainage of several alveolar pus pockets, one is persuaded that the chronic intoxication, the result of absorption from the pent-up infectious process, was an etiologic factor.

CURRENT NEWS

Items of professional news, of general interest, will be welcomed by the Associate Editor at 51 West Forty-seventh Street, New York City.

Early in December, 1914, Dr. John F. Dowsley voluntarily tendered his resignation from the Board of Registration in Dentistry in Massachusetts. For twenty-seven consecutive years, in fact since the birth of the Board in that State in 1887, Dr. Dowsley served in a most efficient way as one of its members, and was its president as well during the last two decades.

Although criticized from time to time rather severely by a few of his brother dentists who attempted to bring discredit upon him, Dr. Dowsley has emerged at all times with colors flying, and he is recognized as an honorable man who has done much for the advancement of the dental profession and who has loyally carried out the arduous duties imposed upon him by the important position he held for so many years.

In 1903 Dr. Dowsley resigned, but was prevailed upon by Governor Russell to reconsider his decision. Again, in 1911, he was almost lost to the Board.

Governor Walsh fully appreciated the faithful service rendered, and expressed his sorrow at this last resignation in the following letter:

BOSTON, Dec. 10. 1914.

JOHN F. DOWSLEY, D.D.S.,
Boston, Mass.

My dear DR. DOWSLEY:

I have your letter of December 9th and have accepted with much regret your resignation as a member of the State Board of Registration in Dentistry. Let me take this occasion to express the gratitude of the people of Massachusetts for the long and honorable service that you have rendered the Commonwealth, in performing so faithfully the exacting duties of the office which you now voluntarily relinquish. You should take especial satisfaction at this time in the fact that you retire from public office with the confidence and respect and gratitude of your fellow citizens.

Wishing you continued success in your private practice, I am

Yours very sincerely,

(Signed) DAVID I. WALSH.

It is of interest to know that Dr. Dowsley has not retired from public life, as for some months he has been actively interested in the work of the great Forsyth Dental Infirmary, situated in the Fenway, Boston, and he is serving as one of the trustees.

* * *

Dr. Marquis D. Littig, 419 Boylston St., Boston, Mass., has been appointed by Governor Walsh to the position on the Massachusetts State Board of Registration, left vacant because of Dr. John F. Dowsley's resig-

nation. It is doubtful whether a more able, sincere and absolutely honest man could have been found, and the State of Massachusetts and the dental profession are surely to be congratulated.

* * *

A meeting of the National Association of Dental Faculties was held at Ann Arbor on Monday evening, January 25th. After some discussion, it was unanimously voted by the colleges represented in the Association that a four-year course be required of dental students beginning the session of 1917.

Dr. Crenshaw of Atlanta, Ga., was elected president and Dr. Bazhaff of Milwaukee, Wis., vice-president.

* * *

The appreciation of the importance of dentistry and dentists is continually increasing. Eminent men are accepting the fact that dentists are essential to hospitals, and the war is proving the necessity for a corps of them in every military hospital.

We quote from *The New York Tribune* of February 7th as follows:

"The American Ambulance Hospital at Neuilly-Sur-Seine has just won additional laurels of which all Americans may well be proud. Prof. Samuel Pozzi, Dr. Carrel, Professor Tuffier, and other high authorities are unanimous in the conviction that surgical experiences of this war demonstrate the supreme importance of dental science in the broadest sense of the term.

"A dozen American dentists now work day and night in the hospitals, being summoned as surgical specialists by the military and civil authorities. The scientific opinion of the French faculty now is, that this war marks a revolution in the science of dentistry by placing this branch in the highest class of surgery and obtaining for dentists a status never before accorded to their profession."

* * *

The seventh union meeting of the Allied Dental Societies of Greater Boston was held at Hotel Brunswick, Boston, Mass., on December 16, 1914.

It was the good fortune of the committee to secure as essayist, John P. Buckley, Ph.D., D.D.S., of Chicago, Ill., who addressed the meeting on "The Treatment of Hypersensitive Dentin and Diseases of the Dental Pulp."

Waldo E. Boardman, D.M.D., presided and the paper was discussed by

Chas. A. Brackett, D.M.D.

William Rice, D.D.S., D.M.D.

Eugene H. Smith, D.M.D.

The committee of arrangements were

A. R. Brown, D.D.S., D.M.D., Chairman

W. A. Davis, D.M.D., Secy

A. I. Hadley, D.M.D., Treas.

The meeting was a very enthusiastic one, orchestral selections being

rendered through the dinner and popular songs sung by the 254 present.

* * *

A short time ago many of the dentists of New York City (and very likely other cities also) received a circular letter from a certain sign company, in which some interesting, though rather distressing, statements were made. Part of the letter follows:

"The recent activity of the practising dentists in the field of advertising has given rise to considerable discussion among that profession, and a reason is being sought by many for this rather sudden change of policy.

"To those familiar with the advertising business, the reason is not hard to find. Wide-awake doctors, realizing that dentistry to be successful as a profession must be a business success as well, have simply adopted modern business methods. As a result they are learning the same truth which successful men in every line of endeavor have long since come to know—It pays to Advertise.

"Whether or not you believe that ethics will do more to put dollars in your pockets than advertising, it will interest you to know that more than one-fourth of the electric signs built by us since July 1, 1914, have been for the dental profession."

This last statement is rather an appalling one, in view of the fact that we expect our profession to advance rapidly in improving ethical standards, and surely no comfort can be gleaned from it.

It should make us consider a little. Too many men are willing to quarrel with the straight-laced but proper "Miss Ethics" because of the spell cast upon them by the almighty dollar, and too many others keep near the border line by becoming secret partners in commercial companies, using peculiar removal notices, publishing a removal notice in a newspaper and in other similar ways.

Legal force should be used whenever possible to stamp out this "It Pays to Advertise" policy from our profession, though education of the college students ought to prove the greatest means of relief.

Really, then, it is "up to" the professor, but all the rest of us share the responsibility.

* * *

The Massachusetts Dental Society has this year been fathering a post-graduate course of lectures, given on Tuesday evenings from January 8 to March 26, inclusive. A fee of \$10 was charged for the entire course.

While this post-graduate instruction has not been carried out on as large a scale as the post-graduate sections of the First District Dental Society of New York, an exceedingly attractive programme was arranged and the course has been most successful.

Among the essayists were the following well-known men: Dr. H. A. Kelly, Portland, Maine; Dr. Francis P. McCarthy; Dr. Arthur Ordway; Dr. Sverker Luttrupp; Dr. W. C. Bridge; Dr. H. W. Cushing; Dr. K.

H. Thoma; Dr. E. J. Kinley; Dr. F. A. Delabarre; Dr. R. W. Tench;
 Dr. Noguchi, Rockefeller Institute; Dr. Leroy Miner; Dr. J. R. Callahan,
 Cincinnati, Ohio; Dr. Ned A. Stanley; Dr. Leon Medalia.

* * *

The following is quoted from *The Springfield Republican*, January 14, 1915:

THE WAR TAX ON TOOTH PASTE.

To the Editor of The Republican:

Your editorial in to-day's issue covers an interesting point. It refers to a protest against the war tax on tooth paste and mouth washes made by a committee of New York physicians and surgeons on the ground that it is a blow at oral hygiene. The physicians and surgeons who made this protest can easily have the best intentions in the world, but I think they are mistaken in the premises.

I know of no tooth paste or mouth wash subject to the war tax which is necessary to the success of the oral hygiene movement. As a matter of fact, too much reliance is put upon preparations and too little upon elbow grease. If you hitch a strong hand to a good tooth brush and keep it going properly for a sufficient length of time you can eliminate the war tax very successfully. A better way to eliminate it, however, is to prepare for yourself a preparation of three parts precipitated chalk, one part powdered castile soap, with a little flavoring of some kind, orris root, wintergreen, sugar or whatever you like, and put a little of this on the brush. It may not be positively stated, but it is probably true, that there is no better preparation made. The advertised and specially packaged preparations which you mention are very largely useless and sometimes distinctly injurious. The simple, home-made preparation which I have mentioned is helpful in that it contains the polishing material needed, the cleansing material, and may be adapted to your own particular taste.

On this basis, assuming that I am right, it seems strange that a body of physicians and surgeons should go to the pains of issuing a protest against the war tax.

Some will argue that I am exceeding the limits of propriety in pointing out as unnecessary articles which have been advertised at great expense. I do not agree. Anything which is sold on the basis of expensive advertising and which of itself is not useful for its supposed purpose can be very well disposed of. As far as it gives work to men and brings money to managers, it is developing parasites, and the country will readily adjust itself to all such difficulties as accompany throwing these people out of employment. I do not, however, believe that many people will differ on this, and it is needless to argue it further.

I am personally glad to support any movement for oral hygiene, and I hope that the New York physicians and surgeons have only usefulness in their minds, but it is going a little too far to say that a war tax on commercial tooth pastes is an injury to the oral hygiene movement.

EDWARD T. HARTMAN.

Boston, January 12, 1915.

BOOK REVIEWS

BY C. FRANKLIN MACDONALD, D.M.D.

A MANUAL OF PRACTICAL HYGIENE. For Students, Physicians and Health Officers. By Charles Harrington, M.D., late Professor of Hygiene in the Medical School of Harvard University. Fifth edition, revised and enlarged by Mark W. Richardson, M.D., Secretary to the State Board of Health of Massachusetts, in collaboration with the following officials connected with the Massachusetts State Board of Health: W. H. Clark, Chief Chemist; X. H. Goodnough, Chief Engineer; William C. Hanson, M.D., Assistant to the Secretary; Hermann C. Lythgoe, Chief Analyst of Food and Drug Department, and George H. Martin, formerly Secretary to the Massachusetts State Board of Education. Octavo, 933 pages, with 125 engravings and 24 plates in colors and monochrome. Cloth, \$5.00 net. Lea & Febiger, publishers, Philadelphia and New York, 1914.

With the creation a few years ago of the degree D.P.H. in many medical schools, the study of hygiene in its many aspects received a new impetus and brought to all minds the necessity for more careful consideration of the means for sustaining the health of the community.

Dr. M. W. Richardson has revised and enlarged for its fifth edition the "Manual of Practical Hygiene," by Dr. Charles Harrington. This volume of 900 pages embodies all that is most recent and authoritative in regard to general hygiene, and seems to have touched all possible phases of this great subject.

The manual commences with the general consideration of food products. The later sections of this first chapter go into details as to the proper preservation of foods; the common means of adulteration with the legal standards demanded and methods for detection of adulteration; the diseases and toxic effects liable to be produced by contaminated meat, fish, milk, and the regulations in force for the protection of the public by proper inspection and handling of these food products.

The air, soil, and water are taken up in three separate chapters. So-called "sewer gas" in its relation to the transmission of disease, is shown to be of very little danger, contrary, perhaps, to the general conception, and it has been made the "convenient scapegoat in explaining obscure questions of various sorts." Even CO₂ gas has been shown not to be the dangerous constituent of ill-ventilated rooms, which it originally was thought to be, and it can be tolerated in considerable proportion without grave danger to health. As to the soil in relation to health and disease, it is admitted that but little is really known. Water as a transmitter of diseases is presented in some detail with the usual chemical tests, and a brief consideration of bacteriological examination.

Two chapters are devoted to the disposal of sewage and garbage, and for the latter the method of incineration is advocated.

"Habitations" considers the general principles of proper arrangements for ventilation, heating, and lighting with a section upon modern sanitary plumbing.

Under disinfectants and disinfection, the various chemical and physical agents are reviewed. Quicklime or "milk of lime" is highly recommended for the disinfection of excreta and privy vaults and infectious stools, being not only active in destroying organic matter and bacteria, but of such slight expense that it can be used in any quantities and on a large scale. Mercuric chloride or corrosive sublimate, while admittedly the most powerful of all metallic salts as a disinfectant, is not considered to be so efficient for general use as has been thought. Especially does it fall short in the disinfection of fecal matter and tuberculous sputum, the general conclusion being that "corrosive sublimate in any of the strengths commonly employed is a much overrated disinfectant." For the disinfection of rooms and articles of furniture or clothing, where steam cannot be employed, formaldehyde gas is urged as far superior to any other disinfectant now known for general utility.

A short chapter considers personal hygiene, the necessity for habits of cleanliness, avoiding excesses of eating and drinking, use of suitable clothing, exercising and proper rest.

The hygiene of occupations goes into the matter of the effects which various occupations may have in the production of disease. The term, "occupational diseases," has been somewhat loosely applied, as many diseases are not the direct result of the occupation, but due to the lowering of resistance resulting from environment, unsanitary conditions and improper precautions. Much has been done, and is being done, to eliminate as far as possible the dangers arising from certain kinds of labor by various devices and legal requirements as to kind of laborers and their proper surroundings. The author enters into this phase of the question quite extensively.

The chapter dealing with medical inspection of the schools is probably the most important and interesting one of all. It presents what should be the aim and practical application of this sort of inspection. Two publications by the Massachusetts State Board of Education for the use of teachers giving suggestions regarding tuberculosis and its prevention and suggestions for the observation of the child in the school room are reproduced, and contain the essential requirements for school hygiene.

At the present day the chapters dealing with military and naval hygiene may be of more general interest than usual. They are devoted to specific phases of hygiene, and would be of primary value to one specializing in this particular line.

The relation of insects to human diseases constitutes a chapter of considerable interest, being a comparatively new field of investigation.

Under administrative control of diseases, the author shows what has been done from the legislative standpoint for the control of disease and producing better and more healthful conditions.

Some statistics of death rates, influence of sex and age, etc., with a

short chapter upon the best means for the disposal of the dead, completes the volume.

This book is a most elaborate treatise upon the subject of general hygiene and, as the title suggests, it is also primarily practical hygiene. While general hygiene but indirectly enters the field of dentistry, it is a subject upon which members of all branches of the medical profession should have more definite knowledge than is usual. For those making a special study of hygiene, in whatever calling they may be, and particularly physicians and health officers, this book should prove most valuable.

ETHICS AND JURISPRUDENCE FOR DENTISTS. By Edmund Noyes, D.D.S., Professor of Ethics and Jurisprudence in Northwestern University Dental School. 250 pages. Cloth, \$2.00. Published by the Author.

This book is rather unique in the literature of the dental profession. In dental society papers the questions of dental ethics and jurisprudence are often raised and discussed. Likewise, in some dental colleges, slight references in lectures may be made to these same questions. It seems, however, that this volume is the first of its kind to combine in a condensed form the principles upon which all conceptions of ethics are based, the application of these general principles to professional life and the law of the land as it interprets justice to the dental practitioner and patient.

The author seems most justified and logical in presenting a short study of general ethics, for, as he states in the preface, "professional ethics can have little respect unless it is understood to rest upon the solid foundation of the general principles of morality."

Part first of the book has to do entirely with general ethics, but in a most condensed manner. It deals only with the recognized principles of morality and those theories which are most commonly accepted. As the author states, this section is drawn in great degree from the extensive writings of Friedrich Paulsen.

The opening chapter of the second section upon professional ethics makes the distinction between a profession and a trade or business. In the consideration of the matter of a fee in the profession as against a price in trade, it is held that charging by the hour approaches the idea of price, and that the fee should rather be made in proportion to what you consider the value of your services to the patient to be, regardless of the time spent in the accomplishment.

Professional advertising, duties to patients and commissions or split fees are taken up in three short chapters, containing modest, sane advice. One paragraph is perhaps worth quoting: "Magnify the professional aspect of your services and make your patients pay you fully as well for removing deposits, prophylactic treatments, removal of pulps, and filling root canals, etc., as for fillings, inlays, crowns, bridges and sets of teeth; and in all these latter operations put the emphasis on the professional services rendered and not on the labor and material."

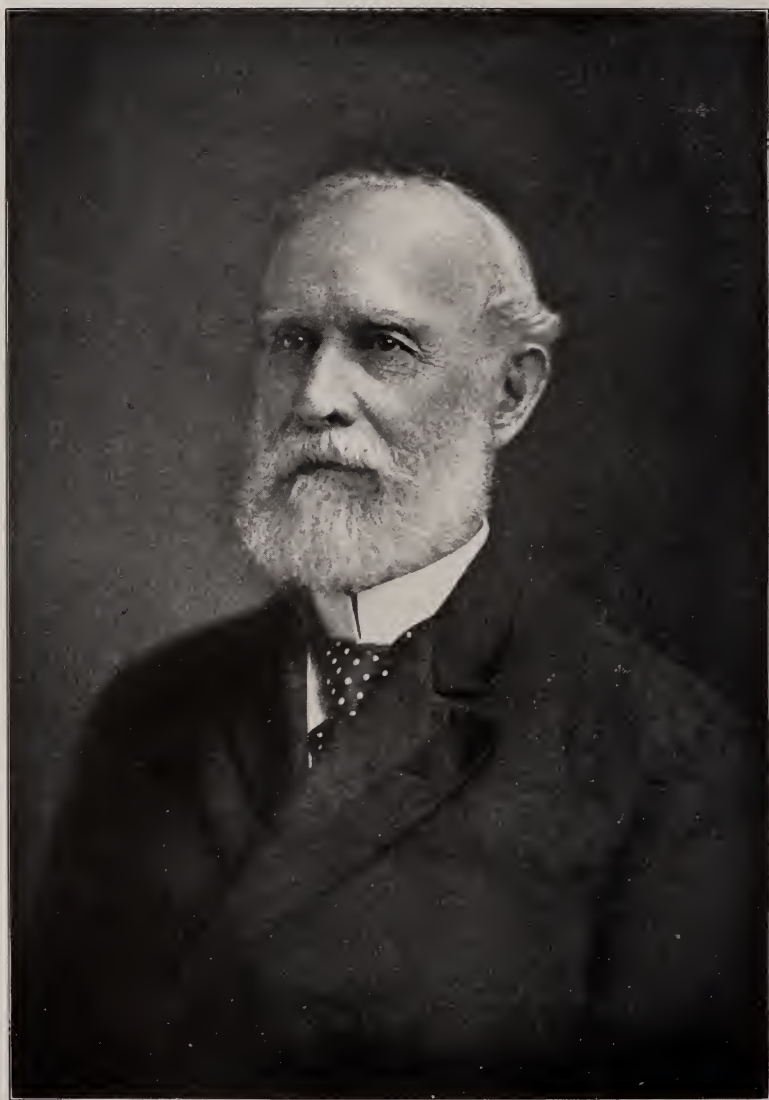
The rather perplexing question which often arises when one does emergency work for the patient of a brother practitioner, as to whether or not a fee should be charged, is answered, it seems, in an eminently fair and just way: "If the service is such that you would charge a fee to one of your own patients, then charge a fee to the patient of another dentist."

Patents is a subject presenting many differences of opinion, and Dr. Noyes has realized the difficulties of laying down definite advice upon the question. Morally, a remittance seems to be right and just, but not from the standpoint of sentiments of philanthropy and professional duty. The author rather urges the principle of the medical code of ethics, which prohibits patents.

The Principles of Medical Ethics of the American Medical Association and Code of Ethics of the National Dental Association are given in full.

The last portion of the book is devoted to the law in its relation to dentists. It is a concise review of the subject, being for the most part extracts from the more elaborate works of W. E. Mikell, E. D. Brothers, and W. F. Rehfus. It is quite sufficient in its contents for the average student or practitioner to gain a general knowledge of his status before the courts and the liabilities assumed by both patients and dentist.

This book, devoting itself in great part to the idealistic in professional life, will not find the wide field for reading which other dental works of more practical nature find, but it is to be hoped that the young men in our colleges will be made acquainted with the book, or in lieu of that, at least with the principles which it enunciates. It should be read by all dentists who have taken upon themselves the obligation of teaching, regardless of what their teaching may consist of from the practical standpoint. It is a book worth reading for any general practitioner who desires to know his profession from other angles than the merely technical side.



Sincerely Yours.
James Truman.

OBITUARY

JOHN MORGAN HOWE

[See biographical sketch of Dr. Howe by Dr. Charles Otis Kimball at page 52 of this issue of THE JOURNAL.]

JAMES TRUMAN

DIED, in Philadelphia, November 26, 1914, JAMES TRUMAN, D.D.S., L.L.D., in his eighty-eighth year.

The following autobiographical sketch and memorial which appeared in the January issue of the *Dental Cosmos* are quoted in full:

[Autobiographical Sketch]

Dr. Truman was born at Abington (Jenkintown), a suburb of Philadelphia, November 22, 1826. When he was two years of age, his parents, George and Catharine L. Truman, returned to Philadelphia, where the family had resided for many generations, its original founder having emigrated from England with William Penn.

Upon the completion of his general education he commenced the study of dentistry with his father, a practitioner of both medicine and dentistry, and then went into practice. This was continued, with some interruptions, until his final graduation at the Philadelphia College of Dental Surgery in 1854. In 1855 he removed to Waterloo, in western New York, where he practiced for three years, returning to Philadelphia in 1858. In 1864 he accepted the position offered him of demonstrator-in-chief of operative dentistry in the Pennsylvania College of Dental Surgery.

The efforts of the earlier workers in this country had been devoted mainly to developing the mechanical side of dentistry, leaving scientific deductions to a future growth. This was at the time unavoidable, but unsatisfactory. Dr. Truman was fully impressed with the importance of extending the scope of inquiry into many unsolved problems. He spent much time in the study, through dissection and otherwise, of the teeth of inferior forms, and this led to a careful examination of the supplemental and supernumerary forms of the human series of teeth, and he subsequently presented a paper on this subject which received recognition both at home and abroad.

He spent much time in an effort to solve the problem of bleaching teeth. There had been some effort in this direction by others with no practical results, and discolored teeth were either permitted to remain a disfigurement or were extracted. The difficulties surrounding examinations in this direction can only be appreciated by practical investigations, but those made by the subject of this sketch finally resulted in a process more satisfactory than any previously applied. The general manipulation of such teeth, and the preparation of the canals, were carefully considered, and while changes in the process of bleaching have been made, the general plan of preliminary treatment remains as he gave it in 1868. It, however, continued for twenty-five years to be an operation subject to much criticism, and one rarely attempted. At the present, through the use of other agencies than were originally adopted, the process has become an accepted part of operative dentistry.

The need of a system of preparing cavities in the teeth for filling with cohesive gold very early claimed Dr. Truman's attention, and efforts

were made to meet this want. His ideas in this direction were formulated in an article in the *Dental Times*, in which he endeavored to reduce the operation to mechanical principles, systematizing the formation of anchorage and making the preparation of the cavity the important basis of successful work. The views of dentists upon this subject have undergone considerable changes since that period.

In 1865 Dr. Truman was elected to fill the chair of "dental physiology and operative dentistry" in the Pennsylvania College of Dental Surgery, and held that position until his resignation in 1876.

It was during his connection with this college that the question of woman's place in dentistry caused much disturbance in the faculty. Prior to 1869 dentistry was regarded as wholly unfit for women to practice. Indeed it was not regarded as one of the occupations which at any time would be attractive to her. The feeling against any change from what had been regarded as her proper sphere was still operating powerfully against her success in medicine.

The peculiar adaptability of women for dentistry as an occupation had long claimed Dr. Truman's earnest consideration, and being fully satisfied that it would furnish an agreeable and remunerative calling for many, he determined to openly advocate it. To this end he incorporated his views in a valedictory to the graduating class delivered to a large audience in Musical Fund Hall, Philadelphia, in 1866. This created some sensation and placed him at once in antagonism with the faculty and generally with the dental profession.

It was not until 1869 that an opportunity occurred to put in practical operation the theories then enunciated. Application was made that year by Mrs. Henriette Hirschfeld-Tiburtius of Berlin, Germany, to be permitted to matriculate as a student. She had come to America highly recommended. The struggle for admission was a memorable one, but was successful, and she finally graduated and returned to her native country to enter upon a remunerative practice. In 1866 a woman, Mrs. Lucy Hobbs-Taylor, had graduated from the Ohio College of Dental Surgery. These two constituted the only two women in the world possessing the diploma of a dental college.

The importance of this matter, as Dr. Truman regarded it, led him to introduce a resolution in the American Dental Association convened at Saratoga, August, 1869, asking for "recommendation to subordinate associations to admit to full membership any women duly qualified." This was laid on the table—a result anticipated by the mover, and while its introduction led to no immediate change in the feeling of antagonism to women in dentistry, it did make eventually a marked impression upon the thought of the profession, and led up to the opening of nearly all dental college doors to women. The immediate result, however, was much bitter feeling in professional circles, which reacted upon the originator of this movement. Time has changed all this, and women are now practising dentistry in all parts of the civilized world; the United States has a dental organization composed wholly of women, and several women have become leading scientific workers, devoting their time to the elucidation of many unsolved problems.

While connected with the Pennsylvania College of Dental Surgery Dr. Truman became editor of the *Dental Times*, a position he continued to fill for four years. Nearly all the productions of his pen during this period were published in that journal.

The use of the mallet in dental filling operations had, up to that time, given such peculiar and varying results that he determined to commence investigations in that direction. This involved the preparation of instruments, and months of careful work. The results were given to the dental

profession, establishing very conclusively that the then much-lauded lead mallet was not equal to the light steel mallet, and that the electro-magnetic mallet of Bonwill, then in its infancy, was far superior to all other mallets, as it entirely overcame mobility. These conclusions have never been contradicted, time simply enforcing the principles then demonstrated.

The use of tin as a filling material had for an indefinite period been part of the armamentarium of the dental profession, but Dr. Truman regarded the methods adopted as defective and the material as not properly prepared. He made extended experiments with tin in various forms,—rolled tin, chipped tin from block, etc.—to secure the greatest amount of cohesion. It was proved that the old method of using tin upon the non-cohesive principle was defective, and that the best results could be obtained by depending upon the slight but effectual cohesive property of the metal.

In 1876 his health was so much broken by persistent efforts in various kinds of work that he concluded to make an entire change, and accepted what seemed a favorable offer at Frankfort a/M., Germany, and removed his family to that city in the same year, resigning his position in the Pennsylvania College of Dental Surgery. The condition of things at Frankfort not meeting his expectations, he left that city in the winter of 1877 and established himself in the city of Hanover.

He was there received with confidence by the better class of citizens, but was subject to much annoyance by the jealousy of members of the dental profession. His practice, notwithstanding, grew rapidly among the nobility and wealthy residents of the province. In 1880 the death of his wife made life in Germany unbearable, and he returned to America and commenced practice in Philadelphia.

On February 28, 1877, the honorary degree of D.D.S. was conferred upon him by the Pennsylvania College of Dental Surgery.

His pen was active from this period as a contributor to dental periodicals in original articles, reviews, and translations. He was one of the associate revisers of the American edition of *Tomes' Surgery*, and also at a later period became a contributor to the "American System of Dentistry."

In 1882 he was elected professor of Dental Pathology, Therapeutics, and Materia Medica in the Department of Dentistry of the University of Pennsylvania. In 1883 he was made secretary, and subsequently dean, which position he held until he retired in 1896.

In 1890 he was chosen to conduct the editorial work of the *International Dental Journal*, published solely by dentists to advance the interests of the dental profession. He continued to be editor of that journal until it ceased publication in 1905. His contributions to the literature of the profession have been mainly confined to work upon dental periodicals, with the exception named and as a contributor to the "American Text-book of Operative Dentistry."

He was a member of various dental associations of America and Europe, and was one of the four who issued the original call for the formation of the National Association of Dental Faculties, which was subsequently organized in 1884 at New York and by adjournment to Saratoga. He has filled various offices of responsibility in this body, having been its president one year. He was the last president of the American Dental Association, and assisted in its transfer to the National Dental Association. This was perfected by the union of the Southern Dental Association and the American Dental Association.

He received the honorary degree of LL.D. from the University of Pennsylvania in 1904.

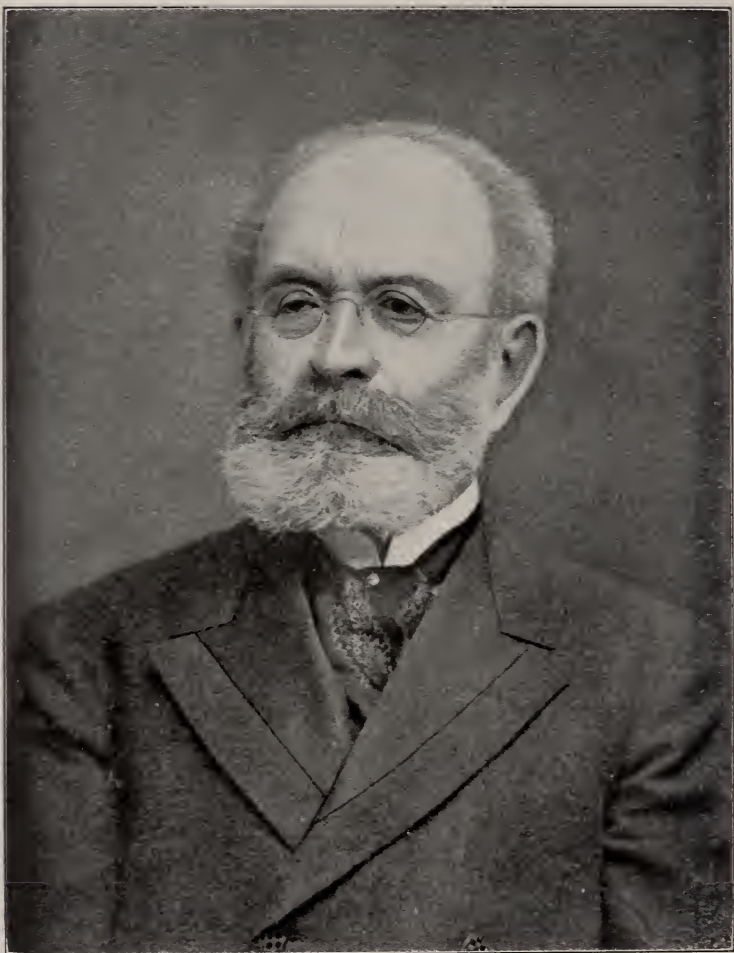
Memorial

In 1909 he retired from active teaching and was made Professor Emeritus of Dental Pathology, Therapeutics, and Materia Medica in the University of Pennsylvania, the title of the chair he had actively and efficiently filled for a period of twenty-seven years.

The passing of Dr. Truman removes one of the commanding figures from the rapidly diminishing group of men who are fairly entitled to be designated as the pioneers of organized professional dentistry. Dr. Truman entered upon the active practice of his profession fourteen years after the establishment of the first institution in the world for the systematic training of dental students. Previous to that time the only means for obtaining an education in dentistry was through the system of apprenticeship then in vogue, at which time, and for many years thereafter in its professional infancy, the practice of dentistry was little more than a trained handicraft. Moreover, its practice was distinctly handicapped by the ideal of commercialism. The possibilities of its scientific development were unrecognized, excepting by a small minority of its more prominent exponents. It was those conditions and that professional atmosphere that confronted Dr. Truman as a novice in the ranks of dental practitioners when he received his qualification to practice his profession in 1854. His reaction to the surrounding professional conditions of his time was characteristic. His larger vision recognized the intrinsic possibilities of his professional calling, and it became his life-problem to demonstrate by his work, by his educational efforts, by his contributions to the literature of his profession, and by his active participation in the deliberations of dental professional associations, his convictions as to the larger possibilities of usefulness which dentistry had to offer to mankind. He brought to the solution of his problem a commanding personality, a vigorous, even at times aggressive intellectuality, a masterly command of the English language, and a dignity and forcefulness of mind which inevitably carried conviction with his utterances.

Dental literature contains no more striking example of impressive oratory than the apotheosis of anesthesia pronounced by Dr. Truman at the banquet given in Philadelphia upon the occasion of the celebration of the fiftieth anniversary of the discovery of nitrous oxid anesthesia by Horace Wells. It is not only a literary classic, but an utterance characteristic of the spirit and ideals of its author.

His unfailing energy, and above all his honesty of purpose, crowned his life's work with success, and he lived to see his chosen calling elevated from the status of a mechanical art to the dignity of a recognized profession. The larger service of his life has been that rendered to dental education, the major portion of which has been given through his service to the Dental School of the University of Pennsylvania. Quite apart from the value of his teachings from the technical standpoint, the influence which as a teacher he exerted over the moral life and the ethical professional standards of his students was invaluable. It was the deep and genuine interest that he felt in the moral development and spiritual growth of his students that served to establish such close and intimate relations between him and those whom he taught. No student who had benefited by his instruction failed to reverence him as a father and friend; even the wrongdoer whom, as dean of the dental school, he was obliged to reprimand, received his admonitions without resentment, for there was always that in his manner which gave assurance that he corrected without malice and with a single eye to helpfulness. If he ever had enemies they were such as were an honor to him, for none who came into contact



DR. LOUIS JACK

with him sufficiently to realize the character of the man ever failed to love him.

The loss of Dr. Truman will be mourned wherever dentistry is known and practiced throughout the civilized world, for he was one of the makers of dentistry and one of the best exponents of its larger possibilities.

It was his specific request personally made to the writer that no reference to his religious views should be published; but without breach of trust, one may be permitted to quote here a statement made by his colleague and almost lifelong friend, Dr. Darby, in connection with his funeral services. Dr. Darby said, "I have never crossed the river of death; I know not (except by the eye of faith) what is beyond the farther shore; but if nobility of character, righteous living, love of mankind and love of justice, charity for all mankind without envy or malice, count for anything as prerequisites for citizenship in that country, then my dead friend will be there."

LOUIS JACK

DIED, December 9, 1914, in his eighty-second year, LOUIS JACK, D.D.S.

Dr. Jack was born in Germantown, Pa., March 26, 1832. At about the age of eighteen he entered the office of Dr. William R. White, of Philadelphia, with whom he remained as a student for a few months; later he was associated with Dr. C. C. Williams. He graduated in 1854 from the Philadelphia College of Dental Surgery. While attending that institution he became acquainted with Dr. Robert Arthur.

"During the winter of 1855-56 Dr. Jack had an office in Dr. Arthur's house, and by reason of his close relation with Dr. Arthur became thoroughly acquainted with his methods of work and with the character of his operations, concerning the high quality and excellence of which Dr. Jack has borne public testimony. When Dr. Arthur left Philadelphia to take up his work in Baltimore many of Dr. Arthur's former patients came under his care, and in 1904 Dr. Jack publicly stated that much of the work done by Dr. Arthur nearly fifty years ago, for those patients who had fallen under Dr. Jack's observation, was in perfect condition, much of the work having been done with cohesive gold.

"Dr. Jack was, by reason of his association with Dr. Arthur, immediately concerned with the former's discovery of the practical utility of the cohesive property of pure gold foil. It had previously been known that certain makes of gold foil for dental use possessed an adhesive or sticky quality, but that quality was until its practical usefulness was demonstrated by Dr. Arthur, generally considered to be a defect—which, as a matter of fact, it was, with respect to the older methods of manipulation concerned in the production of so-called 'soft gold' fillings. During the winter of 1855, however, Dr. Arthur requested Dr. Jack to make tests of the comparative density of crystal ('sponge') gold and ordinary foil. He furnished Dr. Jack with a book of foil which had for many months been left uncared-for in his cabinet. Dr. Jack on commencing to use it found that it was harsh and hard in its working quality. Dr. Arthur suggested annealing to soften it, and immediately observed with surprise the

fact that it would adhere particle to particle like crystal gold. After watching the progress of the test filling made by Dr. Jack he went to his office and proceeded to make practical use of this newly discovered 'adhesive' property. From that date he ceased to use any other kind of gold.

"Dr. Jack has made several contributions to dental literature dealing with the use of cohesive, or as it was then called, 'adhesive' gold foil, and has also definitely fixed the credit for the practical utilization thereof on an historical basis; but while Dr. Jack modestly accords to Dr. Arthur the whole credit for the discovery, the data would strongly indicate that Dr. Arthur and Dr. Jack were jointly the discoverers of the utility of this useful characteristic of our most important filling material."¹

Dr. Jack was a practitioner of distinguished ability. He made many practical contributions to dentistry including the well-known Jack matrices, and was a prolific contributor to dental literature.

Any special reference to Dr. Jack's various professional activities would be incomplete without saying a word regarding his love for independent professional journalism. For many years he was very prominent in the affairs of the "International Dental Journal" and he believed that dentists should control and should attend to the publication of the proceedings of their organizations. It is a strange coincidence that the three men who perhaps were more devoted to the cause of professional journalism than any others—Dr. Truman, Dr. J. Morgan Howe and Dr. Louis Jack—should all have died within a few weeks of one another.

¹ *Dental Cosmos*, LVII, 1915, 233.

NOTICES

PANAMA PACIFIC DENTAL CONGRESS

The Panama-Pacific Dental Congress is to be held at San Francisco, Cal., August 30 to September 9, 1915.

The Transportation Committees recommend the following plans and schedule of railway rates from New York, Chicago, and other points to San Francisco and return:

Following the usual custom, and in order that all those who desire to attend the Panama-Pacific Dental Congress at San Francisco, August 30 to September 9, 1915, may do so with the maximum of comfort and pleasure and minimum of fatigue, and inconvenience, The Transportation Committees announce that arrangements have been made for special train service. The present plan is to have three special trains from Chicago, leaving as follows:

First train, leave Chicago on August 21, going via Burlington route to Kansas City, and the Santa Fé to Los Angeles, and Southern Pacific to San Francisco. Stop-overs will be made at Colorado Springs, Isleta Indian Village, the Grand Canyon, Redlands, Riverside, San Diego, Los Angeles, San Francisco.

Second train, leave Chicago on August 24, going via Burlington route to Denver, thence via Denver & Rio Grande to Salt Lake City and Western Pacific to San Francisco. Train two includes stop-over of one day in Colorado Springs, and special attention has been given to the schedule, so that our party will pass through the scenic points of interest in daylight.

Third train, leave Chicago on August 25, going via Burlington route, to Denver, thence Denver & Rio Grande to Salt Lake City and Western Pacific to San Francisco as in route two. It will be noted that the two trains—that is, the trains leaving Chicago on the 24th and 25th, via Burlington route, will meet in Colorado Springs and proceed from there as one or two trains, according to the number who will take this route. It will also be noted that all the trains have been arranged so as to arrive in San Francisco one day prior to the opening of our convention.

There is a possibility that the number from the East will be sufficiently large to warrant the running of a special train through from New York, in which case the Eastern and Chicago, and in vicinity parties will be consolidated and go as one train from Chicago. In the event that there is not a sufficient number to warrant the running of a special train through from New York, special sleepers will be provided for our use.

For the advance information of those interested in the trip, the Transportation Committees have endeavored to show briefly what the schedules of the trains will be. A circular outlining the trip in detail

will be prepared some time in the near future, and will be distributed generally to members of the association.

To attend the Dental Congress and the Panama Exposition, it is understood that a reduction of fare is made for transportation to San Francisco from any point in United States and Canada.

There is no special train returning. It is, therefore, necessary to decide your return route when purchasing ticket on either of the following schedules.

Train Schedule I.

Lv. Boston 2.00 p. m., August 20, via Boston and Albany.

Lv. New York 5.00 p. m., August 20, via New York Central "Wolverine."

Ar. Albany 8.15 p. m., August 20, via New York Central "Wolverine."
(Connect with trains from Boston and other points in New England States.)

Ar. Schenectady 8.47 p. m., August 20, via New York Central "Wolverine."

Ar. Utica 10.23 p. m., August 20, via New York Central "Wolverine."

Ar. Syracuse 11.40 p. m., August 20, via New York Central "Wolverine."

Ar. Rochester 1.20 a. m., August 21, via New York Central "Wolverine."

Ar. Buffalo 3.10 a. m., August 21, via New York Central "Wolverine."

(Eastern time.)

Ar. Detroit 7.10 a. m., August 21, via New York Central "Wolverine."

(Central time.)

Ar. Chicago 2.00 p. m., August 21, via New York Central "Wolverine."

(Central Station.)

Lv. Chicago 6.10 p. m., August 21, via Chicago, Burlington & Quincy.

Ar. Kansas City 8.00 a. m., August 22, via Chicago, Burlington & Quincy.

Lv. Kansas City 11.00 a. m., August 22, via Atchinson, Topeka & Santa Fé.

Ar. Colorado Springs 6.30 a. m., August 23, via Atchinson, Topeka & Santa Fé.

Lv. Colorado Springs 8.30 p. m., August 23, via Atchinson, Topeka & Santa Fé.

Ar. Albuquerque 1.20 p. m., August 24, via Atchinson, Topeka & Santa Fé.

Lv. Albuquerque 2.00 p. m., August 24, via Atchinson, Topeka & Santa Fé.

Ar. Isleta 2.30 p. m., August 24, via Atchinson, Topeka & Santa Fé.

Lv. Isleta 4.00 p. m., August 24, via Atchinson, Topeka & Santa Fé.

Ar. Grand Canyon 5.00 a. m., August 25, via Atchinson, Topeka & Santa Fé.

Lv. Grand Canyon 8.00 p. m., August 25, via Atchinson, Topeka & Santa Fé.

Ar. Redlands 12.30 p. m., August 26, via Atchinson, Topeka & Santa Fé.
 Lv. Redlands 2.30 p. m., August 26, via Atchinson, Topeka & Santa Fé.
 Ar. Riverside 3.30 p. m., August 26, via Atchinson, Topeka & Santa Fé.
 Lv. Riverside 11.59 p. m., August 26, via Atchinson, Topeka & Santa Fé.
 Ar. San Diego 7.00 a. m., August 27, via Atchinson, Topeka & Santa Fé.
 Lv. San Diego 11.59 p. m., August 27, via Atchinson, Topeka & Santa Fé.
 Ar. Los Angeles 7.00 a. m., August 28, via Atchinson, Topeka & Santa Fé.

Lv. Los Angeles 8.00 p. m., August 28, via Southern Pacific.

Ar. San Francisco 9.45 a. m., August 29, via Southern Pacific.

Railway fare from New York to San Francisco, via the above route and returning via any direct route (not including Grand Canyon)\$98.80

The Wolverine—Fast Express—New York to Chicago, extra fare.. 6.00

Those desiring a less expensive train to Chicago can leave Grand Central Terminal 2.00 p. m., August 20, due Chicago 5.00 p. m., August 21, with no extra fare.

Railway fare from Chicago to San Francisco, excluding Grand Canyon going via the above route and returning via any direct route\$62.50

Side trip from Williams to Grand Canyon and return..... 7.50

Lower berth from New York to Chicago..... 5.00

Lower berth, Chicago to San Diego (estimated)..... 18.50

Lower berth, San Diego to Los Angeles..... 1.50

Lower berth, Los Angeles to San Francisco..... 2.50

Several fraternities and many members of the National Association are to travel by this route.

Special plans are being made by Dr. J. P. Marshall, 7401 Hazel Avenue, Maplewood, St. Louis, Mo., for the accommodation of dentists from St. Louis and southern points to join these scheduled trains.

From Philadelphia and adjacent points on Pennsylvania Railroad connection can be made with these scheduled trains going west from Chicago.

Train Schedule II.

Lv. Chicago 11.00 p. m., August 24, via Chicago, Burlington & Quincy.

Ar. Denver 7.00 a. m., August 26, via Chicago, Burlington & Quincy.

Lv. Denver 8.00 a. m., August 26, via D. & R. G.

Ar. Colorado Springs 10.30 a. m., August 26, via D. & R. G.

Lv. Colorado Springs 10.30 a. m., August 27, via D. & R. G.

Ar. Salt Lake City 12.30 p. m., August 28, via D. & R. G.

Lv. Salt Lake City 1.00 p. m., August 28, via Western Pacific.

Ar. San Francisco 5.00 p. m., August 29, via Western Pacific.

Railroad fare from Chicago to San Francisco going via the above route and returning via any direct route.....\$62.50

Returning via Portland, Ore..... 80.00

Lower berth, Chicago to San Francisco (estimated)..... 15.00

Train Schedule III.

Lv. Chicago 11.00 p. m., August 25, via Chicago, Burlington & Quincy.

Ar. Denver 7.00 a. m., August 27, via Chicago, Burlington & Quincy.

Lv. Denver 8.00 a. m., August 27, via D. & R. G.

Lv. Colorado Springs 10.30 a. m., August 27, via D. & R. G.

Ar. Salt Lake City 12.30 p. m., August 28, via D. & R. G.

Lv. Salt Lake City 1.00 p. m., August 28, via Western Pacific.

Ar. San Francisco 5.00 p. m., August 29, via Western Pacific.

Rates will be the same as Route II, except that a lower berth from

Chicago to San Francisco will be\$13.00

Those desiring to go by the Northern routes, via Portland, return-

ing by a central or southern route, there is an added charge of. 17.50

Applications for space:

Starting from Boston and vicinity should be addressed to Mr. C. E. Colony, City Ticket Agent, B. & A. Road, Boston, Mass.

From New York, Mr. W. V. Lifsey, General Eastern Passenger Agent, New York Central Lines, 1216 Broadway, New York.

Starting from Chicago, address Mr. A. J. Puhl, General Passenger Agent, Chicago, Burlington & Quincy, 141 South Clark Street, Chicago, Ill.

Starting from Kansas City or southwestern points joining at Kansas City, address Mr. G. W. Hagenbuch, General Agent, Santa Fé route, 905 Main Street, Kansas City, Mo.

Starting from New York or New Orleans to San Francisco by the Southern Pacific Company routes.

Ships of the Southern Pacific Steamship Line leave New York on Wednesdays and Saturdays at twelve noon for New Orleans, arriving the following Monday and Thursday, respectively, and from New Orleans continue on the Southern Pacific Railroad to San Francisco. The rate by this route from New York to San Francisco, returning by any central or southern route, is.....\$94.30

Or according to the route and train selected from Chicago east.... 96.55

This rate includes berth and meals on steamer from New York to New Orleans. There is an added Pullman charge for lower berth from New Orleans to San Francisco of..... 11.50

For space on steamer address Mr. L. H. Nutting, General Passenger Agent, Southern Pacific Company, 1158 Broadway, New York.

Starting from New Orleans, address General Passenger Agent of Southern Pacific Company, Mr. J. H. R. Parsons, Camp and Poydras Streets, New Orleans, La.

The Transportation Committees would suggest that before purchasing tickets that each person verify the particular schedule of the route chosen in going and in returning.

Transportation Committee, National Dental Association.—Dr. Victor H. Jackson, Chairman, New York; Dr. H. F. Hoffman, Denver, Colo.;

Dr. Jos. D. Eby, Atlanta, Ga.; Dr. D. C. Bacon, Chicago, Ill.; Dr. Henry W. Weirick, San Francisco, Cal.; Dr. J. P. Marshall, St. Louis, Mo.

Transportation Committee, Panama-Pacific Dental Congress.—Dr. Henry W. Weirick, Chairman, San Francisco; Dr. Harry P. Evans, New York; Dr. Alpheus R. Brown, Boston, Mass.; Dr. E. M. Carson, St. Louis, Mo.; Dr. F. W. Gethro, Chicago, Ill.; Dr. Jos. D. Eby, Atlanta, Ga.; Dr. Chas. F. Fiset, Seattle, Wash.; Dr. B. W. Berthel, St Paul, Minn.

MASSACHUSETTS DENTAL SOCIETY

Editor of THE JOURNAL,

SIR: I beg to inform you that the Fifty-first Annual Meeting of the Massachusetts Dental Society will be held May 5, 6, 7, 1915, Hotel Somerset, Boston, Mass.

Very truly yours,

A. H. ST. C. CHASE, Secretary.

SECOND DISTRICT DENTAL SOCIETY, S. N. Y.

YOU ARE INVITED

by the Second District Dental Society to attend the Best Dinner and the Best Meeting on Monday evening, April 12.

You are especially and particularly invited—if you want to, bring a friend—whether or not you receive an invitation by mail.

Reserve this evening for a meeting that will signal a marked advance in scientific dentistry.

We want you to hear Dr. Elmer S. Best, of Minneapolis, Minn., read his paper, "The Responsibility of the Dentist in Pulpless Teeth." This is the result of over two years' experiment, study and trial. Some of the ablest men in medical and dental professions will discuss this problem.

You will realize, we are confident, that the scientific world and the world of public opinion are placing upon the dental profession's services a valuation and a responsibility new, serious and portentous.

Dr. Best has a forceful, convincing and intensely earnest personality. What he says you feel sure is true. His sound conclusions are projected with a relentless logic and a delightful delivery.

The dinner (informal), \$2.50 per cover, and the meeting will be held in the new Hotel Bossert, Brooklyn. The beauty and completeness of its appointments and service are unsurpassed. If it is more convenient to stay over night, you may do so at reasonable rates. Tables for six and eight will be reserved upon receipt of check sent and made payable to Arthur M. Hunter, Treasurer of the Dinner Committee, 67 Hanson Place, Brooklyn.

A. M. NODINE,

Chairman of Dinner Committee.

F. C. WALKER,

A. H. HUNTER.

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1915

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Dr. G. Evans,

55 West 39th St

New York.

THE JOURNAL

OF THE

ALLIED DENTAL SOCIETIES

VOL. X

JUNE, 1915

No. 2

THE JOURNAL CONFERENCE

The Annual Conference in the interests of Professional Journalism was held on Saturday, April 3, in New York City. Ten prominent dentists made the trip from Boston, and these gentlemen, together with some of their New York confreres, spent the morning in going over the handsome building of the College of Dental and Oral Surgery and in an instructive trip to the Museum of Art, where all the available time was used in viewing portions of the J. P. Morgan and B. Altman collections. An automobile bus was hired for the occasion.

After luncheon, which was served at the City Club to thirty-three men, the afternoon was given up to the conference. Thirty-seven were present to hear the most encouraging reports regarding THE JOURNAL that have ever been given. Dr. William Rice in the chair, called the meeting to order. In his opening address, Dr. Rice stated his belief that THE JOURNAL has made a place for itself that can be filled by no other magazine and that while he was delighted at the establishment of *The National Dental Journal*, our own journal should keep on in its own particular sphere.

Report of last conference read and accepted and Dr. Davenport, Jr., reappointed to serve as secretary. Report by Dr. Karl C. Smith, treasurer, was most favorable, as it showed quite a large increase on the right side. Report accepted with thanks.

Dr. Dunning stated that the circulation was growing naturally and that a thoroughly competent advertising manager had been added to the staff. He spoke of the great loss that "Professional Journalism" has sustained during the past year in the passing away of three of its most prominent supporters. Drs. J. Morgan Howe, James Truman and Louis Jack. The editors of the various departments were then thanked by their chief for their good work during the year.

Dr. Davenport, Jr., made a plea for news items for the "Current News" department, as very few of these have been sent in without being requested specially. Dr. Carney, speaking on the advertising situation, said that because of the high standard set by THE JOURNAL, some "ads" had been refused during the past year, but that Colgate & Company and a few others would surely be added within the next two issues. He also stated that the advertising rates had been doubled. Dr. C. F. MacDonald, Jr., and Dr. W. D. Tracy next spoke regarding their particular departments.

Drs. Kemple, Percy Howe and H. S. Parsons reported for their societies, Dr. Parsons taking the place of Dr. Warner, who was not well. Several points of interest were brought up by these gentlemen, one being the excellent editorials that have appeared every issue, the result of the unusual ability along this line of Dr. W. B. Dunning. The ability of the editor was also commented upon by Dr. H. H. Piper and Dr. H. W. Gillett, while Dr. C. Edson Abbott spoke at length upon the advance in dentistry and the part THE JOURNAL has played in helping in this scientific development. Dr. Piper and Dr. Richburg referred to the general tone of the magazine and its pleasing external appearance.

The duty of the profession in supporting professional journalism was made clear by Dr. Gillett, who spoke heartily in favor giving the editors of our own journal every assistance possible. The points of special interest in Dr. Davenport's report

for the Publication Committee were as follows: that Dr. Fred L. Bogue had been to a great degree responsible for the work connected with THE JOURNAL during its early life: that there are now many warm supporters, Drs. Hyatt and Wheeler, for example, having done remarkable work in securing new subscribers: that the financial report was the best ever given: that our magazine is now worthy of support on merit alone: that \$500.00 was left to the Lord Fund of the First District Society by the late Dr. J. Morgan Howe.

The next speaker, Dr. Herbert L. Wheeler, chairman of the Publication Committee of the National Dental Association, gave some interesting information regarding the *National Dental Journal* and expressed the firm conviction that before long the New York State Society would choose our journal for its official organ. He urged all present to keep fighting for the cause of "Professional Journalism."

Short speeches by Drs. E. A. Bogue, Waugh, Schamberg (the last named advising the addition of an X-ray department when possible), Ferris and Swift closed this part of the programme. Dr. Ferris suggested that translations from foreign journals should appear in our journal.

Moved and seconded that the secretary send a letter to Dr. Fred L. Bogue expressing the sympathy of all present on his illness and their sorrow at his absence. Motion carried unanimously. Moved and seconded that same officers be reelected for ensuing year. Motion carried. Dr. Rice was complimented upon his efficient conduction of the conference affairs and reelected chairman of Board of Publication.

Dr. Kemple appointed chairman of a new committee for increasing the circulation with power to choose his own associates. Motion for adjournment.

At seven o'clock dinner was served at the Republican Club, nearly forty gentlemen being present. The following programme

was carried to a successful conclusion: Welcome to our Massachusetts Friends—Dr. H. L. Wheeler: Response—Dr. H. H. Piper: Independent Journalism as a Factor in Elevating Our Professional Position—Dr. Wm. D. Tracy, Dr. Chas. M. Proctor: THE JOURNAL—Dr. Wm. B. Dunning.

No other conference has ever been as well attended as this last, nor has as much interest been shown. Drs. Proctor, Rice, Howe, Abbott, Richburg, Parsons, Warner, Adams, Sawyer and Piper, who made the journey from Boston, all felt amply repaid for their trip and returned full of enthusiasm, while on the other hand, all the New York men were encouraged by their loyalty and presence. The conference was a remarkably successful one and all who attended expressed themselves as pleased with the continued improvement of THE JOURNAL and as desirous of doing all in their power to assist in any way possible.

Respectfully submitted,

S. E. DAVENPORT, JR., *Secretary*.

INDEPENDENT JOURNALISM AS A FACTOR IN ELEVATING OUR PROFESSIONAL POSITION¹

BY CHARLES M. PROCTOR, D.M.D., BOSTON, MASS.

The fundamental principles of a profession are thought and service; thought to crystallize and focus, that the fullest service may be rendered.

For nearly a century the leading men in dentistry have endeavored to make it worthy the honor and dignity of a profession.

On June 1, 1839, there appeared in New York City the first dental publication in the world: the *American Journal of Dental Science*—and this just a year previous to the establishment of the first college for the study of dentistry as a profession. This Journal was published for ten years under the auspices of the American Society of Dental Surgeons, when, from lack of funds, the publication was taken over by a few of the leading men of the profession, among whom I find the name of Dr. E. J. Dunning, the paternal grandparent of the present editor of The Journal of the Allied Dental Societies. Is it any wonder, then, that with such inherited tendencies the present editor of our Journal has produced for us this magnificent magazine of dentistry?

In a recent perusal of the Journal of 1850, I found in it a number of articles depicting many problems which are of deep concern to the profession to-day, viz: "Treatment of Dental Neuralgia," "Necrosis of the Inferior Maxillary," "Treatment of Exposed Dental Pulp," by Dr. H. K. Nutz, of Philadelphia, in which the author takes exception to the administration of arsenic. "Treatment of Dental Caries, Complicated with Disorders of the Pulp and Peridental Membrane," by Robert Arthur, D.D.S., the first man ever to receive a dental degree. "The Food and the Teeth: Observations on the Inorganic Constituent of the Food of Children, as Connected with the Decay of the Teeth," by Dr. James Paul, together with articles on Professional Ethics, etc.

¹ Read at Journal Conference, New York, April 3, 1915. See p. 125.

The advertising department was unique, for in a volume of 570 pages there were only thirteen devoted to this section, and they pertained solely to college announcements and the publication of the latest books, together with the announcement of four or five different manufacturers of dental and surgical instruments. In professional journalism this is a phase which I think calls for some consideration. There are men who feel that this department should be entirely eradicated from a professional journal; on the other hand, there are others, and I am one, who feel that the advertising of the armamentarium of the profession should be in a position to command the attention of all the readers of dental literature. The evil to be avoided, however, is in the making of this department the primary reason for the publication; as illustrated in a recent issue of one of our trade journals, which had 96 pages of advertising matter as against 72 of text. How many times have I heard it said that the most interesting section of a dental journal is the advertising department! Repeatedly, have men informed me that their first interest in and perusal of the magazine was through the advertising section. I feel that this is a serious fault and I fail to comprehend how a man who makes such a boast can advance in the confidence and respect of the community as a professional man, when apparently his chief interest lies only in the fact that the monetary side of dentistry is uppermost in his mind. For he who fails to read and think and come to logical conclusions in his own mind regarding dental problems, can, at best, render only a mediocre service to those who put themselves in his hands for professional care.

In a paper presented before the Connecticut State Dental Society, in April, 1906, Dr. J. E. Nyman, of Chicago, says in part:

"There is a perfect surfeit of dental journals these days. We are being stuffed with them beyond our ability to digest and assimilate. Every supply house that has capital to do so is publishing a dental journal, and the publishing department is now regarded by these concerns as a purely commercial factor, as essential as the sales, bookkeeping and shipping departments, and as a result, the character and influence of our current literature has depreciated. The editors of a journal should be the priests of the profession, and by impartial publicity and unprejudiced advice

should right wrongs, correct errors, and lead the profession on to better things. Great injustice has on occasion been done by elaborating one side of an honest controversy and withholding all mention of the other. The weekly publication of a journal edited by capable men of our profession who should be paid salaries for their services would be of great benefit to dentistry."

No progressive movement is capable of fruition unless there is behind it a medium of expression. "As a man thinks, so is he." Only as a profession is capable of giving its best and unbiased thoughts can it hope to reach a goal of attainment and dignity worthy of the name.

There can be no doubt to the rational and thinking mind that the professional journal, which stands primarily for the principles of ethics and effort and for a closer relationship of its members, is the greatest possible factor in the advancement of the thought which it represents, and it should also have as its constant aim the idea that it must provide the essence of the fundamental principles of the profession.

Men who give most generously, whether it be of time, money or effort, are, as a rule, recognized as the leaders of their community. Therefore, in professional journalism, he who would give that his colleagues might receive and be helped thereby ought never to be hampered in the giving by ulterior motives or the personal ambitions of others. In *The Journal of the Allied Dental Societies*, we all know that there is a place for any man to contribute the best there is within him, to express his thoughts or record whatever scientific data he may have, without the fear of an unjust editorial pencil.

We are taught that truth is a divine attribute; therefore, so long as our paper stands for this principle (and I know that this has been the standard under which it has existed), so long will it be the strength, support and stimulus of those members into whose offices it goes.

As a profession, we have long since passed the adolescent stage of our existence, and find ourselves coming into our own. Never before in our history have we so enjoyed the confidence of our medical confreres. For years previously there had seemed to be a certain amount of selfish feeling and jealousy on both sides.

In the great advancement of preventive medicine, the M. D. has, step by step, eliminated many possible sources of disease, with the exception, or at the best with only a casual consideration of the oral cavity. The dentist, on the other hand, has been guarding his field of operation so zealously that he has lost sight of the broader aspect and vital relation which it holds to medicine.

We are, however, at the dawn of a new era. The thinking men in both professions are recognizing, as never before, how much closer their relationship must be in co-operating for the benefit of humanity. This is no better exemplified than in those often quoted but no less significant remarks recently made by Dr. Charles Mayo of Rochester, Minn., in which he stated that "The next movement in preventive medicine must come from the members of the dental profession: will they do it?" I have often thought that there was just an element of doubt as to our capability in this last phrase. The challenge has been sent to us, and we must put forth every effort to qualify. How then can this best be done? To the student in the college there will be emphasized more strongly than ever before the need of a more thorough training in the elementary medical subjects; but to the active practitioner, this is of little use, unless he should elect to take post graduate work. There is, however, the one medium through which the profession can rise to this occasion, and that is through the professional journal. Our magazine is about to start upon the tenth year of its career, and from every side I hear only commendation upon the articles which appear therein. In a recent conversation with Dr. J. R. Callahan, of Cincinnati, Ohio, he made the remark that his interest in *THE JOURNAL* was very vital; that he looked forward to each issue, and had interested other men in his city to subscribe for it. When men like Dr. Callahan delight in a publication of this kind, is it any wonder that we can feel assured that our work is the very cement which unites us in the elevation of our colleagues in their professional life.

I wonder how many of you, when in youthful days, back in the hills of New England, remember the tramps over dusty roads to the Little Red School House on the hill, where amid crude surroundings you received those first instructions, which,

later, served as a stimulus for the achievements of your life; how, after a day of application and study under the guidance of a worthy Master, you stepped forth on your homeward way, and, nearing the turn in the road, glanced back to see outlined against the orange and red of the evening sky, that little temple from whose doors so many had gone to face life, to fight and conquer, —becoming captains of industry and service—while you wondered if by chance and determination, that some day your name, too, would be among those who had achieved success through life's way. Did their genius and character develop from the fact that the seats were hard, the light poor, and the building bare? No. But it did come from the principle for which it stood; education, patriotism, love for one's country and fellow-man, with the guiding hand of the Master back of all.

To those responsible for our Journal, I would assert that a like spirit must radiate from between the covers of our magazine, to produce within ourselves and the hearts of our fellow-men that active power which calls for the highest attainment of their professional life. To our Editor I would say that as a dynamo sends its power to unseen nooks and corners to give light and power to those who need it, so must you continue to give, as you always have, of your fund of ability and knowledge; for you know not what ambition you stimulate in the hearts of those who read your Journal.

I can no better exemplify these thoughts than to quote the poem of a very dear friend.

THE DYNAMO'S SONG

Hear me, and I'll sing to you
Music never listened to;
For you must be helped to hear.
Customs prejudice the ear,
And the great world doesn't know
That a painted dynamo
Has a voice that surely means
Just as much as those machines
Poets tell of in the books,—
Mill-wheels turned by mountain brooks,
Saw-mills where the torrent roars,
Spinning wheels in cottage doors.

In the city's heat and toil,
Here amidst the smoke and oil,
Where the steady fires burn,
And the crank-shafts turn and turn,
Where the dash-pots clank and clash,
And the switches snap and flash,
If you only feel and see,
Here is also poetry.
Swing and thrust and rise and fall,
There's a harmony in all;
Every piece its place and time,
Working out the perfect rhyme,
Brushes on the copper ring,
High and clear the note they sing,
Playing something new and strange
On the theme of endless change,
Telling how the wire wheel,
Moving in its frame of steel,
Helps transform the latent might
Of coal-beds into life and light.
He who built me, coil and pole,
Knows me to the very soul,—
Spools and windings, shaft and core,
What each part is fashioned for.
I'm a servant to his hand;
But he doesn't understand
What the wires take from me,
What the fire-flow can be.
Flooding through the buried mains,
Pulsing in the metal veins,
Goes my subtle silent stream,
And I follow in a dream
Into distant thoroughfares,
Into cellars, up the stairs,
Drive the loom and sew the dress,
Cut the paper, move the press,
Brighten up the printed page,
Light the chancel and the stage.
Brushes on the copper ring,
Gently glide and softly sing;
I must never show a sign
Of the mighty task that's mine.
Dynamos that rasp and spark
Leave the city in the dark;
Wrapped around my iron drum,
Quietly I croon and hum.

LOUIS J. MAGEE.

PROFESSIONAL JOURNALISM¹

A profession of the standard attained by dentistry, that has such a record of progress and achievement, must have an independent and official publication. A publication owned and managed by the dental profession that shall be free to set forth scientific facts as they are, and unhampered by allegiance to any dental trade interests.

When the youth reaches manhood, if he be normal, he desires to become independent of the many restraints under which he has grown up, and to express himself with freedom. It was this very sense, or the same desire for unrestricted expression that gave birth to the first real independent Dental Journal and has perpetuated it. Thus we see that professional evolution brought about the independent publication and now what can the Independent Journal do for the profession? It gives, as stated before, an opportunity for unrestricted publication of all scientific facts, researches, experiments, analyses, etc.

It dignifies the profession which it represents and conveys to the mind of the outsider the fact that dentistry has outgrown its period of being a mechanical art only, and that it occupies a plane as high as any of the other professions.

It is, in a way, degrading for a calling such as ours, to be dependent for the publication of its current scientific literature upon the dental supply houses. By this no reflection upon the dental manufacturers, or upon their journals is intended, but the principle is wrong and the reflection is upon us, who have for so long allowed the most valuable asset the profession has ever had to be manipulated by the manufacturers, primarily for their own interests, and secondarily for our interest.

This is one thing the independent dental journals will ultimately do; they will corral and control and publish the current literature of value as it is produced and give it directly to the profession. They will stimulate the co-operation of individuals and organizations, and this cannot but have an elevating and uplifting influence on the profession.

Who knows but that this Journal of the Allied Dental

¹ Address by Dr. Tracy at Journal Conference, New York, April 3, 1915. See p. 125.

Societies may one day develop into the ideal dental publication. In any event, those who have so generously fostered its interests have the satisfaction of knowing that they are traveling with their eyes in the right direction.

W. D. TRACY.

CHEMICAL STUDIES OF THE RELATIONS OF ORAL MICROORGANISMS TO DENTAL CARIES¹

BY WILLIAM J. GIES AND COLLABORATORS.

1. On the Importance of a Reexamination and an Extension of Available Knowledge Pertaining to the Kinds and Chemical Influences of Oral Bacteria in their Relations to the Teeth²

BY WILLIAM J. GIES.

(From the Biochemical Laboratory of Columbia University, at the College of Physicians and Surgeons, New York.)

It is obvious that dental caries is initiated by factors that operate outside of the teeth, or within the teeth, or both externally and internally. It is possible that "conditions of the oral environment" are *wholly* responsible for the *incidence* and progress of decay. It is equally conceivable that "weakness of dental structure," or "faulty constitution of the teeth," entirely accounts for ordinary *susceptibility* to decay.

The respective shares of influence of factors in the *environment* and *constitution* of the teeth, in the *inauguration* of dental caries, has by no means been determined. Available evidence indicates strongly that caries is due, in many cases at least, to the *coincidence* of *both* external and internal injurious factors. Working under the auspices of the Dental Society of the State of New York, and the Scientific Foundation and Research Commission of the National Dental Association, we are investigating the influence of "constitution," by means of "studies of internal secretions in their relation to the development and condition of the teeth."³ In the series of researches to which this and the

¹ Reports of findings in investigations conducted under the auspices of the First District Dental Society of the State of New York.

² It had been our intention to present, in this issue of the *Journal*, the remainder of the report on our work for the academic year 1913-1914, as already suggested by us (*Journal of the Allied Dental Societies*, 1914, ix, pp. 554, 583), but details in our recent bacterio-chemical study have become so numerous that publication in this issue, of the *introductory* (1) and *historical* (2) parts of our report for 1914-15 is particularly desirable, as an early prelude to our oral report, next November, on the *chemical* findings. The concluding portion of the report for 1913-14, on effects of food-acid media, will be published in the next issue of this *Journal*.

³ Morgulis, Perlzweig and Gies: *Transactions of the Dental Society of the State of New York*, 1914, p. 105; *Dental Cosmos*, 1915, lvii, p. 276.

succeeding paper relate, we are endeavoring to determine some of the essential facts regarding the influence of environment, by means of studies of oral microorganisms and their anti-dental chemical activities.

Three years ago, in referring to the development of our researches under the auspices of the First District Dental Society, I wrote as follows:⁴

Finding that the quantitative composition of the saliva, so far as we studied it, failed to offer a clue to the nature of dental caries, we assumed that other features of the oral environment than the saliva were responsible for the disease. Accordingly, we turned to an investigation of the *bacterio-chemistry of dental caries*. This research involves an extensive study of the nature, growth, activities, and destruction of oral bacteria; of the chemical properties and physical qualities of mucin; of the solvent powers of the products resulting from the bacterial transformation of food substances, and similar matters. Last May we stated some of the results of the *preliminary* experiments in these connections.⁵ The studies are now in progress; and, although they cannot be completed within the year, we hope to report details of the work at an early date, especially in relation to mucin and mucin salts.

Some of the results of the studies of "mucin and mucin salts" have already been published.⁶ The work on mucin, and the related study of the effects of food-acid media on natural extracted teeth,⁷ temporarily interrupted the execution of our plans thoroughly to investigate the relation of oral bacteria to caries. We have resumed work in this relation, besides continuing the investigations pertaining to saliva, to mucin, to effects of food-acid media, etc.

Our preliminary excursion into the field of oral bacterio-chemistry was very instructive for us but for nobody else.⁸ We learned how little is known accurately in this relation, and to appreciate the great difficulties in the way of exact research in this territory. Among the important questions in this relation that have not been definitely answered are the following:

⁴ Gies: *Journal of the Allied Dental Societies*, 1912, vii, p. 213.

⁵ Lothrop: *Journal of the Allied Dental Societies*, 1911, vi, p. 297.

⁶ Gies: *Journal of the Allied Dental Societies*, 1912, vii, p. 397; Lothrop: *Ibid.*, p. 410.

⁷ Lothrop and Gies: *Journal of the Allied Dental Societies*, 1913, viii, p. 283; 1914, ix, p. 554.

⁸ Lothrop: *Journal of the Allied Dental Societies*, 1911, vi, p. 297.

What particular types of bacteria *occur* in the mouth (saliva, nasal secretions, oral membranes, dental surfaces, etc.) under conditions that prevail during immunity from, or ordinary susceptibility to, dental caries?

How may these types be most satisfactorily *identified* and *classified*?

Where in the oral cavity do the individual types of bacteria localize—i. e., where do they *colonize*?

Which of the distinguishable types of oral bacteria are *inhabitants* of the mouth, which are merely *visitors* there?

How *frequently* and how *abundantly* does each type occur under given conditions, in dental health and disease?

Which types are *aerobic*, which *anerobic*; and what is the relation of the “oxygen supply” to the *manifestations* of the powers of each type?

Which types are *parasitic*, which *saprophytic*?

Which types are *pathogenic*; which are *non-pathogenic*?

What is the influence of oral *protozoa* on oral bacteria, and vice versa?

What special methods are best adapted for the artificial *cultivation* and *study* of the individual types of oral bacteria, with their characteristic oral qualities unaltered or not materially affected?

How do given types behave *in the presence of others*?

What are the biological and chemical *characteristics* and *powers* of each type, especially with reference to the qualities of their nutritive and metabolic products under oral conditions; also, to the effects of their metabolic products on themselves and associated organisms, and on enamel?

Which bacterial types are *acid* producers in any or all ordinary oral environments; which of them *never* develop acidity there?

Which are inactive or destroyed in *alkalin* oral media; which in *acid* media?

Do oral bacteria produce *other substances than acids* that dissolve or disintegrate enamel?

What are the effects, on the nature and chemical powers of the oral flora, of different kinds of *human food* and food residues

on and between the teeth; of variations in the condition of the *teeth and oral membranes*; of fluctuations in the amounts and conditions of the *substances secreted* (e. g., mucinate, antibodies) and *excreted* (e. g., sulfocyanate, nitrite) in the saliva and oral fluids; of substances dissolved from "*fillings*"; of variations in the *general health* of the individual?

Do *materials dissolved from enamel or dentin*, through the agency of one or more types of oral bacteria, materially affect the activity of these or associated types?

Is immunity from decay in man or animals coincident with the uniform absence of any particular types of oral bacteria? Is the occurrence of decay synchronous with continuous presence of any such microörganisms?

Bacteriological literature fails to present satisfying answers to these pertinent inquiries. The important developments, in recent years, in both the art and science of bacteriology, have rendered obsolete many time-honored statements and procedures in these relations.

These and other questions of similar dental import afford themes for the studies described in the series of papers of which the succeeding one, by Dr. Kligler, is the second.⁹

⁹ Our last preceding paper pertaining to research under the auspices of the First District Dental Society of the State of New York was published in the *Journal of the Allied Dental Societies*, 1914, ix, p. 554.

CHEMICAL STUDIES OF THE RELATIONS OF ORAL
MICROORGANISMS TO DENTAL CARIES¹

BY WILLIAM J. GIES AND COLLABORATORS.

2. A Biochemical Study and Differentiation of Oral Bacteria
with Special Reference to Dental Caries. (I)²

BY I. J. KLIGLER.

*(From the Biochemical Laboratory of Columbia University, at
the College of Physicians and Surgeons, New York.)*I. HISTORICAL.³

1. Introduction.—Early in the history of bacteriology, the flora of the oral cavity received special attention. It was soon realized by bacteriologists that in no other entrance to the body do more favorable conditions exist for the development of many types of microorganisms. That the mouth is a conspicuous port of entry for many infections has long been appreciated.

Mucus, epithelial fragments, toothpulp, various secretions and food rests provide an abundant variety of favorable media for bacterial growth in the mouth. (The contention of Sanarelli that salivary secretions possessed bactericidal properties has been disproven by Miller and others.) The border between the teeth and gums, the spaces between the teeth, and cavities in the teeth, offer diverse conditions of variable oxygen concentration, a very important determining factor in the environment of these delicate forms. The temperature, too, is very favorable for the development of most of the microorganisms, being, as shown by Bachellet, practically constant between 35.6° C. and 36.5° C. on the interior side of the teeth, and only slightly lower on the exterior side of the teeth.

Many observers have attempted to determine the nature of the flora of the human mouth. Numerous types have been isolated and described by various investigators without any attempt

¹ Reports of findings in investigations conducted under the auspices of the First District Dental Society of the State of New York.

² Accepted, by the executive officer of the Department of Biological Chemistry of Columbia University, as Part I of a dissertation, submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, in the Faculty of Pure Science, Columbia University, June, 1915.

³ The second section of this dissertation will be published in the succeeding issue of the *Journal of the Allied Dental Societies*.

at systematic grouping. In many instances the descriptions of the types are so meagre that they are practically useless as a basis for comparisons of the available data. We cannot, at present, differentiate, except in a few instances, the passing invaders from the permanent inhabitants, or the harmless saprophytes from the true parasites, of the mouth. Of the forms described, there is little definite information regarding the abundance or frequency with which they occur in the mouth. Küster (Kolle and Wasserman, 1911) says in this connection: "As non-pathogenic cultivable bacteria such a large number have been described by various authors that it is out of the question to describe them fully here; aside from this, the reports regarding the frequency of occurrence, the morphology and biology, are unfortunately either incomplete or show such an inadequate bacteriological experience of the authors, that a comparison of their individual findings seems useless."

The same is also true of the bacteriology of normal and decayed teeth. The classic work of Miller did little more, unfortunately, than break the ground. The available technique in his day was so crude that it is surprising that Miller obtained the wealth of information he did. The greater number of characteristic mouth forms described by Miller fall into his group of "non-cultivable" types, his descriptions being purely morphological—obviously of little significance in the characterization of bacterial types.

Since Miller's day remarkable progress has been made in the development of bacteriological methods, in the perfection of a system of classification, and in the discovery of new tests for the differentiation of microorganisms by means of their biochemical activities. The purely morphological types of Miller's day are rapidly being replaced by more definite physiological species.

Although a worker here and there has applied the new methods for the isolation of a specific form found in or between the teeth, no attempt has been made to apply them to a comprehensive systematic study of the bacteria of healthy and diseased teeth. Probably the best summary of the subject from this standpoint, since Miller's, was that made by Goadby, who also contributed valuable information on this subject. Goadby's

work was done, however, more than fifteen years ago, his results are only qualitative, and his descriptions of characteristic types are meagre and generally based on the work of others. Rodella (1905) made an important contribution to this subject by calling attention to the anerobic flora of the saliva and its possible importance. As yet no one has confirmed Rodella's findings, nor has any one made a thorough study of the entire microbic life, aerobic and anerobic, the relation of the types to each other, their effects on one another and their *relative* abundance, frequency and importance.

In 1892 Miller wrote: "The great number of different bacteria which have been obtained in the mouth . . . has hitherto made their classification impossible. We are unable with few exceptions to state which of these bacteria occur most frequently in the mouth or under what conditions the different kinds develop best. . . . A classification of the bacteria of diseased tooth pulp has not been made as yet." This accurately indicates the condition of oral bacteriology at the present time.

2. **Oral Microorganisms in General.**—In speaking of the microbes of the mouth, we generally include all forms from all parts of the oral cavity. It is difficult to say with certainty, however, which of the organisms mentioned in the literature should be regarded as *inhabitants* of the mouth and which as visitors. Certain it is that much of the descriptive material is unreliable; but it is extremely hazardous in a summary, such as I am attempting to give here, to say with confidence which data can be relied upon. Certain criteria, somewhat arbitrary perhaps, had to be resorted to in selecting the designated types which probably make up the flora of the mouth. These criteria were: (a) the regularity with which the types are reported by the different workers; (b) the extent of the descriptions given; and (c) the frequency with which the types were found to appear in the mouth. In all cases attempts were made to discover from the literature the seat of the organism, its abundance in the mouth, and the frequency with which it occurs there. The forms regarding which there is uncertainty from these three standpoints, are excluded from consideration here.

Miller, in his classic work, divides the microorganisms of the mouth into two large groups: (1) the cultivable forms and

(2) the uncultivable forms. Into the latter group fall most of his characteristic buccal types. This division is, however, no longer tenable. Many of the uncultivable species reported by Miller have since been isolated. Besides, the division is purely artificial and should be replaced by a more natural one based on biologic relationships.

On a biologic basis the oral microorganisms fall into three main divisions: (1) Animal parasites: *protozoa*; (2) Intermediate forms: *spirochetes*; (3) Plant organisms: *bacteria*.

(1). ANIMAL PARASITES (PROTOZOA). The animal parasites have not been studied as intensively as bacteria, probably because of the greater difficulty involved. Only four types of protozoa supposed to *inhabit* the human mouth have been described. Of these four only one can be claimed with some *certainty* to be a specific mouth form. This is the *Endamoeba buccalis* (Prowazek).

Endamoeba buccalis is found exclusively in human beings and is present, according to Hartman, in almost every human mouth, being especially abundant in carious teeth. It is a small (6-32 μ), actively motile, ameba, forming only few pseudopodia. It shows, while at rest, a distinct division of ectoplasm and endoplasm, the former being more refractive and homogeneous, while the latter has many vacuoles. It has a small nucleus poor in chromatin material but readily visible. It divides in the usual way.

The same organism has probably been described by Grassi as *A. dentalis*, and by Gros as *A. gingivalis*. It is also quite likely that the ameba reported recently by Barrett to have been found in pyorrhea, and associated by him with the cause of the affection, is the same as *E. buccalis*. The description given by Barrett is very much like that for this form. The disintegrated white blood cells and bacteria in pyorrheal pockets offer ideal food for the development of these unicellular organisms. The relation of these protozoa to pyorrhea has not yet been determined, though Bass and John have been able to confirm the findings of Barrett and Smith. The rôle of the streptococci, and the favorable effects of autogenous vaccines, still remain to be explained. It may be, of course, that the cocci are secondary invaders and merely serve as food for the amebae; but this has not

yet been established. These findings show, however, that this type of protozoan is a usual *inhabitant* of the mouth.

Another ameba found several times in the human mouth, generally associated with osteomyelitis of the lower jaw-bone is the *E. Kartulisi* (Dœfflein). This organism was discovered by Kartulis in Egypt, in 1893. It is highly pathogenic and is supposed to be localized in the mouth. It is often found there in connection with jaw-bone diseases. This ameba is 30-38 μ in diameter, shows no distinct differentiation between ectoplasm and endoplasm, and has a small nucleus containing a well defined nucleolus. It is actively motile and usually sends out only one long thin pseudopod.

Two other protozoa have been found, one in sputum, the other in tartar; but their descriptions are so inadequate that it cannot be determined to which group they belong. These forms are included here, however, because of the meagreness of the available data regarding mouth protozoa.

(a) *Protozoan* (Ellerman). A small motile form, very closely resembling cocci, except for their motility, measuring $\frac{1}{2}$ -1 μ . They are frequently found in the sputum. Ellerman observed them nine times in thirteen people.

(b) *Protozoan* (Baumgartner). Observed only in sections of teeth; generally present in the outer layer of the enamel. Two or three nuclei are generally present. (The lack of differential value of such a superficial description is obvious.)

(2) INTERMEDIATE FORMS (SPIROCHETES). The second or intermediate group of mouth organisms includes the spirochetes. These forms were first observed, in the mouth, by Leeuwenhoek (1722). Later one type was described by Miller (1892), under the name *Sp. denticola*. It was, however, one of the "uncultivable" forms and his description was necessarily superficial. Very little attention was paid to spirochetes until the epoch-making discovery by Schaudinn (1906) of the spirochete of syphilis (*Tr. pallidum*). This discovery gave a new impetus to the study of mouth spirochetes, and a number of renewed attempts were made to cultivate these organisms.

Mühleus, in 1906, reported success, and described a type of mouth spirochete, closely resembling the *Sp. denticola* of Miller, which grew anerobically on serum-agar. Hoffmann and Prowa-

zek (1906) made a careful study of a series of smear preparations and described three different types—(a) *Sp. dentium*: Delicate in structure; thin, flexible body; quite regular, closely set, shallow spirals; (b) *Sp. media*: Intermediate form; (c) *Sp. buccalis*: Large, thick spiral, with few flat curves. All had undulating membranes and flexible bodies and, therefore, belonged to the genus *Spirochaeta* (Ehrenberg).

Repaci (1912) reported the successful cultivation of four mouth spirochetes in glucose-agar under anerobic conditions. He gives a thorough description of the biological characters of these forms and claims that they are different from the Prowazek types. An analysis of his descriptions, however, brings his types A and C into the intermediate group (*Sp. media*); his type B into the *Sp. buccalis* group, while his type D remains unclassified.

Noguchi (1912) cultivated successfully, by his own method, two spirochetes from teeth which belonged to the *Sp. dentium* and *Sp. media* groups, respectively, and suggested the names *Treponema microdentium* for the former and *Tr. macrodentium* for the latter. Later in the same year (1912) he reported the isolation of another type from a case of *pyorrhoea alveolaris*, which is smaller than *Sp. dentium* but resembles it closely, except for the fact that it produces in pure culture both mucin and a strong fetid odor. This he names *Treponema mucosum*.

Gerber, after a series of smear studies (1910, 1912), described at least five types which he claims are normally present in the mouth. His results can not, however, be accepted with the same confidence as those of Mühleus, Repaci and Noguchi (especially the last two, who worked with pure cultures). The species described by the latter three observers are, therefore, the only ones which may be tentatively accepted as distinct types.

According to Noguchi (1912), the relative number of the three types that occur in the normal mouth varies "greatly according to the conditions of the mouth and to the localities from which the material is obtained." The smallest type is more abundant between the teeth and gums, and in the cavities of carious teeth. The remaining two types, on the other hand, are more frequently found in the mucus about the tonsils and pharynx, and in large numbers in ulcerative stomatitis.

Gerber (1910) found spirochetes in normal and diseased

mouths, and especially on tartar in normal mouths. The following table given by him is of interest:

| Normal Mouth. | No. of Examinations. | Cases. | Spirochetes. | |
|------------------------|----------------------|--------|--------------|----|
| | | | + | — |
| Tonsils | 39 | 38 | 10 | 29 |
| Tartar | 35 | 34 | 29 | 6 |
| Tongue | 8 | 6 | 4 | 4 |
| Miscellaneous | 7 | 5 | 0 | 7 |
| <i>Diseased Mouth.</i> | | | | |
| Tonsils | 28 | 22 | 7 | 21 |
| Carious teeth..... | 2 | 2 | 2 | 0 |
| Tongue | 2 | 2 | 1 | 1 |
| Miscellaneous | 21 | 12 | 7 | 14 |

It is evident that these forms are not more prevalent in diseased mouths than in healthy ones; and it is of especial interest to note their predominance in tartar. Unfortunately, Gerber has not examined a sufficiently large number of carious teeth, nor does he tell us how abundant were the spirochetes in the various cases examined.

Thibandeau examined the secretions between the teeth and gums, and the mucus on the papillae of the tongue, in 149 healthy people and reports the presence of one or another type of spirochete in 41 per cent. of the cases. He, also, fails to give us data regarding the relative abundance of the organisms. It must also be borne in mind that both authors worked with smears only. It is evident from these findings that spirochetes are usual inhabitants of normal mouths.

Other workers, notably Plaut and Vincent, Goadby, and Weaver and Tunncliff, observed spirochetes in association with other forms, especially the *B. fusiformis*, but the first were unsuccessful in cultivating them while the last obtained them in impure cultures. Tunncliff even claimed that the spirochetes and fusiform bacilli were morphological variations of the same organism, a view that has not been confirmed. Goadby confuses spirillae with spirochetes, and one cannot be certain to which forms he alludes in his discussions. He claims that "presence of spirilla is a marked feature of pathological conditions," and that he found them in 75 out of 85 cases of chronic alveolar osteitis, but it is doubtful whether he refers to spirochetes or to spirillae.

Before proceeding to describe the types that occur most frequently in the mouth, a word may be said regarding the system-

atic position of the *Spirochaetes*. There has been a good deal of discussion as to whether these organisms are protozoa or bacteria. Many protozoölogists agree with men like Prowazek, Doefflein and others, on one side, claiming that they are protozoa; or with Novy and Dobell, on the other, contending that they are true bacteria. The arguments, pros and cons, need not be repeated here. The fact is that the spirochetes resemble both bacteria and protozoa, and, for the present at least in accordance with the position taken by Calkins and others, should be considered as an intermediate group.

The mouth forms belong to the genus *Spirochaeta* (Ehrenberg) or to *Treponema* (Schaudin) according as they are parasitic or not parasitic. Since the types found in the mouth have not been observed elsewhere, we may follow the lead of Noguchi, and include them under the genus *Treponema*. Exception must, however, be taken to the specific names suggested by Noguchi, as the names *dentium* and *media* take precedence over his *microdentium* and *macrodentium*, respectively. The three types of spirochetes which occur frequently in the human mouth are, therefore: (a) *Treponema dentium* (Koch); (b) *Treponema medium* (Hoffman and Prowazek); (c) *Treponema buccalis* (Cohn). The descriptions which follow are taken from those given by Mühleus, Repaci and Noguchi.

Treponema dentium (Koch, Noguchi). Morphology: A small, delicate, flexible form, 4-10 μ long, about 0.2 μ thick; regular, closely set, shallow spirals, on an average 14 in number; the ends taper to fine points. Motility: Rotating, active. Cultivation: Mühleus cultivated what was probably a mixed culture of the *dentium* and *media* types on horse serum-agar (1-3) under strictly anerobic conditions; Repaci reports successful isolation in glucose-agar (this probably refers only to the *Sp. media* and *Sp. buccalis* types); Noguchi used the serum-agar-tissue medium employed by him for the isolation of *Tr. pallidum*; strict anerobic conditions are absolutely essential. Cultural characters—Serum-agar: Growth becomes perceptible between the fifth and tenth days at 37° C. only; along the stab canal the growth appears as an irregular whitish streak without definite contour; young cultures have *slight* odor but, after about three weeks, a characteristic fetid odor is observed. Broth: Forms a flaky dirty sedi-

ment leaving the broth clear; gives a marked fetid odor; does not produce gas. Pathogenesis: No pathogenic effect observed in rabbits, guinea pigs and mice. Occurrence: At juncture between teeth and gums, and in carious teeth.

Treponema medium (Hoffman and Prowazek). Morphology: Varies with age and condition of culture; in young culture they are plump, short, with rather irregular shallow curves, the extremities taper abruptly, show double refraction; in older cultures they are longer and thinner, and taper more gradually; the curves are shallow, regular and almost rectangular; the organism is 0.7-1.0 μ thick and 3-8 μ long with 2 to 8 curves in young culture, and 0.3 μ wide and 12 μ long with 14 or more curves in older cultures. Cultivation: It is strictly anaerobic and grows only at 37° C.; glucose-agar, serum-agar, or serum-tissue-agar can be used for isolation; growth appears in 5-10 days, not earlier. Cultural characters—Serum-agar: faint, hazy, almost transparent colonies.—Liquid media: grows only feebly in liquid media; does not attack glucose, dextrin or sucrose; slight action on lactose; milk slowly acidified; no gas, slight odor. Pathogenicity: Not pathogenic for laboratory animals. Occurrence—In mucus on teeth, tonsils and pharynx and, in large numbers, in ulcerative stomatitis.

Treponema buccalis (Cohn). Morphology: Large mouth spirochete, $\frac{1}{2}$ -1 μ thick, 12-20 μ long; the spirals are polymorphic, showing many S forms, with flat large uneven curves; ends are rounded. Motility: Marked. Staining: Stains well with Giemsa and Burri stain; stains unevenly with gentian violet and other anilin dyes. Cultivation: Repaci is the only one who apparently succeeded thus far in isolating and growing this type in pure cultures in glucose-agar under strictly anaerobic conditions; growth appears after the third day; grows only at 37° C. Cultural characters—Glucose-agar: Regular, glistening, discoid colony; whitish at edge, yellowish in center; cultures give putrefactive odor. Pathogenicity: Slightly pathogenic for rabbit and guinea pig.

(3). PLANT ORGANISMS (BACTERIA). By far the largest group of organisms found in the normal mouth belong to the order *Schizomycetes*. All the three main families—*Bacteriaceae*, *Coccaceae* and *Spirillaceae*—as well as some of the higher bac-

teria—*Leptothrix*, *Sporothrix*—are always well represented. Here, especially, great confusion exists, since many cultivable forms have been isolated and separately described by different workers; and it is extremely difficult to differentiate between permanent mouth parasites and transient forms. The mouth is so veritably a gateway for all forms of bacteria that it is not sufficient merely to record the fact that such and such organisms have been found there. Systematic comparative studies must be undertaken to determine the relative abundance and frequency of occurrence of the types detected.

The first extensive study was made by Miller (1892) who, in his classic book, laid the foundation of dental bacteriology. He divides the mouth bacteria into (a) specific mouth forms, and (b) cultivable non-pathogenic and chromogenic types. The cultivable types, however, were most likely transient air, water and food types, while the specific mouth forms were not cultivable on the media then in vogue. Furthermore, Miller, working on the assumption that anerobes could not exist in the mouth, did not attempt to cultivate any anerobic bacteria!

Besides this classic contribution, a few others stand out from among a host of publications. Podbielsky (1891) examined the mixed sputum, and teeth and tongue scrapings, of fifty healthy individuals—25 adults and 25 children. He found *Sp. buccalis* absent from only 9 children between 5-14 months of age; while *Lept. buccalis* was absent from only 11 children less than 7 years of age. Comma forms were observed in 26 and rods in 15 cases. He observed a tetracoccus in 20 cases. He records the cultivation of 12 types of liquefying and 3 of non-liquefying cocci; 7 liquefying and 9 non-liquefying bacilli; 2 vibrios, 1 cladothrix and 2 yeasts. Though his work seems to be painstaking, there is no record of the frequency in occurrence of these types except in the two instances mentioned. His descriptions also fail to accord with any definite system.

The significant point in Podbielsky's examinations is the comparative absence of spirochetes and leptothrix forms in young children. This observation was confirmed by Oshima (1912), who found leptothrix absent from toothless infants but increased in abundance with the advancing age of children. Oshima also found that cocci occur abundantly at all ages, gen-

erally predominating over all other types. Oshima's results are also of interest in that he studied the flora of the mouths of 200 *normal* children from the ages of 1 month to 8 years. Unfortunately he examined smear preparations only, and hence his results merely indicate the predominance of certain large groups. His general results are tabulated below, though the crude method he employed renders their value doubtful.

| <i>Age</i> | <i>No. of Cases</i> | <i>Types</i> | <i>No.</i> |
|------------|---------------------|--------------|------------|
| 6-12 mos. | 78 | Cocci | all |
| | | Leptothrix | few |
| 2 years | 47 | Cocci | all |
| | | Leptothrix | 18 |
| 3 years | 18 | Cocci | 18 |
| | | Leptothrix | 15 |
| | | Spirillae | 12 |
| 4 years | 12 | Cocci | all |
| | | Leptothrix | all |
| | | Spirillae | all |
| 5 years | 11 | Cocci | 9 |
| | | Leptothrix | 11 |
| | | Spirillae | 11 |

The condition of the mouths of children 6, 7 and 8 years of age was similar to that found in children of 5.

Other studies bearing on this subject are those of Freund (on the mouth chromogens), Vignal, Vincentini, Sieberth, Williams, Dobrzyniecki and Goadby. The best work along this line was done by the last named author, who made a comparatively thorough study of the bacteria of dental caries and also succeeded in cultivating two of the specific mouth forms mentioned by Miller. Rodella's work on the mouth anerobes has already been referred to.

An interesting contribution to this subject has recently been made by Pickerill and Champaloup, who studied the bacteria of the mouths of Maori children 4-15 years of age. Fifty individuals immune to caries were examined, Gram stains having been made of mixed saliva and of gingival deposit. The value of this work, like that of Oshima, is greatly impaired by failure to carry out exact quantitative cultivation. Their results have, however, a general interest in showing the nature of the predominant types in these normal, immune children; and the difference between the flora of the saliva and that of the gingival deposit.

| Organism | Cocci | | | | Bacilli | | | | Threads | | Spirals | |
|---------------------------------|----------------|--------|--------|------|---------|-------------|--------------|----------|------------|--------------|---------|-----------------|
| | Gram Negative. | Strep. | Staph. | Dip. | Maximus | Other Forms | Mesentericus | Fusiform | Leptothrix | Fine Threads | Commas | Spirochetes (?) |
| Saliva: per cent.... | 79 | 98 | 37 | 42 | 55 | 26 | 61 | 20 | 45 | 29 | 22 | 39 |
| Gingival deposit: per cent..... | 88 | 88 | 34 | 42 | 54 | 32 | 54 | 32 | 68 | 54 | 74 | 80 |

It is evident, from what has been said, that our knowledge of the flora of the mouth is not in a very satisfactory condition. I shall attempt, however, in this section as in the previous ones, to indicate the probable nature of the mouth bacteria, their characters and abundance, by a critical analysis of the data at hand.

Bacilli of the Normal Mouth. A large number of rod-shaped organisms have been found frequently in the normal mouth. Such forms as *B. diphtheriae*, *B. pseudodiphtheriae*, *B. coli*, and others have been found by numerous investigators in normal, healthy mouths. These cannot, however, be considered characteristic mouth bacteria. A number of rod forms are practically always found in the mouths of all normal people. These may be divided into aerobic and anerobic groups.

(a) *Aerobic bacilli.* There is only one organism specific for the mouth that belongs to this group. This is the *B. maximus buccalis* described by Miller and found by him quite frequently in the normal and diseased mouth. It was first isolated and thoroughly described by Goadby under the name of *B. maximus*. Goadby believes that it is identical with both Miller's and Vignal's *Leptothrix buccalis*. From Goadby's description it is undoubtedly a long bacillus having a tendency to form filaments. In older cultures spores may be observed. This form has been isolated by him from a number of cases and carefully described.

Another aerobic rod characteristic of the mouth has been isolated and described by Baumgartner under the name *B. iogenum*, which the author believes to be identical with the *Jodococcus vaginatus* described by Miller. The description of the bacillus is briefly as follows: *B. iogenum*—Morphology: 0.8-1.7 μ x 5-25 μ ; stains unevenly with iodine, showing round, coccus-

like, blue granules in an almost colorless sheath (these granules are, according to Baumgartner, the cocci described by Miller). Biology: The bacillus is readily isolated on ascitic-fluid-, serum- or sputum-agar; is strictly aerobic and fails to liquefy gelatin. No data are given as to spore formation, staining reactions, growth on ordinary media, acid production in sugar broth, indol production, etc. I am not at all convinced that the author was dealing with a bacillus and not with a member of the sporothrix group of organisms. I believe it was the latter.

Aside from these strictly oral rods, a number of others are invariably found which belong mainly to the group of air and water saprophytes. Thus, Goadby found different varieties of *B. mesentericus* and *B. proteus*. Vignal mentions a number of different types of bacilli, but his descriptions are so poor that they are practically useless. Pigment-producing bacilli have also been isolated from the mouth by Dobrzyniecki, Freund and others; but, though the descriptions and data as to abundance and frequency are meagre, the forms undoubtedly belong to the group of saprophytic chromogens. Red, yellow and green pigment-producers are also described by Miller. These are most likely the prodigiosus, lutea and fluorescens types, respectively, found abundantly in air, water, etc.

(b) *Anerobic bacilli*. It may appear very improbable, but it nevertheless is true, that up to 1905, when Rodella published his paper on the anerobes in the mouth, no mention was made of these forms by any of the workers in this field of bacteriology. Neither Miller nor Goadby, nor the summary in Scheff's Handbuch, alludes to these microbes. Among the various anerobic forms that aroused the greatest interest and stimulated most work by various investigators, are the fusiform bacilli. These were first described by Plant (1894) and by Vincent (1896) in association with spirochetes in certain pathological conditions now known under the name Vincent's angina. Numerous other investigators afterwards observed and studied these organisms, and attempted their isolation; but it was not until 1904 that Lewkowicz reported successful results.

The fusiform bacilli occur almost invariably in the normal mouth, and are especially abundant in the various mouth diseases.

Krumwiede isolated these organisms from noma, ulcerous tongue, angina, pyorrhea, carious teeth, and spongy bleeding gums. Ozaki isolated them from tartar of healthy people. Repaci found them in the mouth of an individual in good health. Rodella claims that they are sometimes present in large numbers on the tartar on healthy teeth.

Besides the papers mentioned above, there is an enormous literature, consisting mainly of clinical reports on the presence of these types in various pathological conditions. An idea of the size of this literature may be obtained from the fact that, in 1904, Beitzke summarized 113 papers not including Italian, and in 1907 Babes (Kolle and Wassermann) in his article on the fusiform bacilli, also listed a large number of papers. From all this mass, however, no definite positive conclusion can be drawn, since only a few workers succeeded in cultivating these bacteria; and the descriptions are based, in each case, on only one or two strains, and disagree in many particulars.

Soon after Lewkowicz's report of the successful isolation of fusiform bacilli, Ellerman (1905) and Mühleus and Hartman (1906) succeeded in cultivating them from a case of gangrenous stomatitis, and from normal mouths, respectively. In 1908 Baumgartner found fusiform bacilli in gangrenous tooth pulp and in the deep layers of carious teeth, but did not grow them in pure culture. Fairly detailed descriptions of these bacteria were published by Repaci (1909) and Ozaki (1912), who succeeded in cultivating them in pure cultures from normal mouths. Rodella (1905) also reports the isolation of a fusiform bacillus from carious teeth but curiously enough, he reports the presence of spores which were not observed by any other worker. It is more than likely that either these spores were contaminations or else he was not dealing with fusiform bacilli.

The only systematic study of a large number of pure strains of fusiform bacilli obtained from different sources is that reported by Krumwiede and Pratt (1912).

While there are a few points, in this connection, on which all authors agree, the greatest possible confusion exists regarding other properties. All agree that the organism grows only under anerobic conditions, that it is Gram-negative (except Ro-

della), that it stains unevenly, that it is non-spore-bearing (except Rodella), that it has pointed ends and, finally, that it shows a certain pleomorphism. On the other hand, Lewkowicz, Ellerman, Mühleus and Hartman, and Weaver and Tunnicliff all claim that the organism grows only in the presence of serum; while Repaci and Ozaki claim that serum is not necessary. Krumwiede and Pratt state that serum is necessary for successful isolation, that after isolation the organism will grow for a while without serum, but that for continued vigorous growth serum is necessary. Evidently different strains vary in this respect.

More decided differences exist regarding pathogenicity and fermentation reaction. Repaci's strain attacked glucose, lactose and sucrose, and was highly pathogenic. Ozaki's strain attacked none of the sugars and, like the strains reported by the other workers, was non-pathogenic. Krumwiede's strains, 15 in number, all fermented glucose, failed to ferment lactose, while about half attacked sucrose.

It is possible, of course, that this group of organisms consists of more than one species and that there are saprophytic as well as parasitic forms. For the present, however, until more exhaustive study is made, we can only accept the results obtained by Krumwiede and Pratt as of definite value, since they are the only authors who worked with a number of strains of different origins. The following description is taken largely from the report of these authors.

B. fusiformis. Morphology: The typical organism is a double pointed bacillus, straight or somewhat bent, granular and very variable, varying with the medium; in solid media the organism is uniform; in liquid media filaments are generally formed; does not produce spores. Motility: The organism is not motile. Gram-stain: negative. Characteristics of growth—Agar: Grayish white colonies, which, in shake-cultures, have a puff-ball appearance.—Broth: Flocculent growth in bottom of the tube. Indol production: Always marked. Odor: All cultures give a disagreeable fetid odor; hydrogen sulfid has been observed by most workers. Fermentation: Very likely fermenting and non-fermenting strains exist; Ozaki's strain did not ferment any sugars; Repaci's fermented glucose, lactose and sucrose; Krum-

wiede's strains all fermented glucose, galactose, fructose; while some also fermented sucrose; all failed to attack arabinose, lactose, raffinose, dextrin, maltose, dulcitol, inulin and glycerol; no gas was produced in any of the sugars. Viability: The culture may remain alive from 20-60 days depending on where it is kept; longer in the ice box than in the incubator. Pathogenicity: Unfortunately Krumwiede and Pratt did not determine the pathogenicity of their strains; of the other workers, Repaci is the only one whose strain was highly pathogenic; Paul, working with a mixed culture of fusiform bacilli and cocci, isolated from a case of gingivitis, found that it produced subcutaneous abscesses and caused death in three days when injected intraperitoneally; of course, the coccus may have played a more important rôle in this than the fusiform bacillus.

Besides this form, which is undoubtedly an inhabitant of the mouth, Rodella would include the well-known anaerobes belonging to the *B. putrificus* and *B. butyricus* groups, respectively, which possess powerful proteolytic properties, as well as the power of splitting carbohydrates to butyric acid. So far, however, his work has not been confirmed, while Baumgartner (1913) maintains that he was unable to demonstrate the presence of anaerobes in carious teeth.

Cocci of the Normal Mouth. Members of the diplococcus, streptococcus and staphylococcus groups are always present in the normal mouth. Pasteur, Sternberg, and more recently Park and Williams, and others, have isolated typical pneumococci from saliva, mouth, nose and throat. *Diplococcus catarrhalis* has been found in sputum by Seifert, Pfeiffer and numerous other workers. Other varieties of diplococci are found, but these have not been definitely described.

Streptococci are always abundant in the mouth. In fact they are so numerous that, when sputum is inoculated into sugar broth, they so rapidly overgrow all other types as to appear almost in pure culture. Goadby, following Lingelsheim's nomenclature, designates what he calls the mouth streptococcus as *Str. brevis*. The classification of this group of bacteria is, however, in an uncertain state, while it has been shown by many observers (Hopkins, Kligler and others) that length of chain is not a satisfactory criterion for the differentiation of these organisms.

Staphylococci of the white and orange varieties have been found frequently by Goadby, Pobiedoniesz, Dobrzyniecki and others. But these forms are found with equal, or greater frequency on the surface of the skin and other parts of the body. It is possible that there are specific mouth varieties, but these have not been described. The *St. tetragenus* (*Alb. tetragenus*), discovered by Gaffky, has been frequently found in the healthy mouth as well as in abscesses.

A coccus supposed to be specific for the mouth, characterized by its blue colorization with iodine, was described by Miller under the name *Jodococcus vaginatus*. No other reference was made to this organism but, recently, Baumgartner claimed that it was identical with his *B. iogenum*. Nothing definite can be gathered from the meagre descriptions at hand.

Anerobic cocci have been reported by Baumgartner and by Ozaki, the former from a fetid abscess, the latter from the mouth of a healthy individual. Ozaki records the property of gas production in sugar media, a character not as yet known to exist among the cocci. Since these are isolated reports of single doubtful findings it is hardly desirable to give a more detailed description of these types.

Spirilla in the Normal Mouth. Miller described a spirillum, which he found in each mouth in varying proportions depending on the care given it. It occurs in small numbers in "clean" mouths and very abundantly in "neglected" mouths. This vibrio he named *Spirillum sputigenum*. It is comma-shaped, actively motile, and closely resembles the cholera spirillum. Miller did not succeed in cultivating this form on any of the media tried by him.

Goadby and Mühleus both cultivated vibrios, the former an aerobe, the latter a strict anerobe, which each claimed to be identical with the *Sp. sputigenum* of Miller. Which one of these authors is right is hard to tell. The mouth harbors at times a number of vibrios, Miller himself having isolated three aerobic types. It is likely, therefore, that the anerobic comma-shaped organism isolated by Mühleus is the true *Sp. sputigenum*. Repaci succeeded in isolating three anerobic spirals, two from a case of leucoplacia and one from a normal mouth. Those isolated from

the pathological condition were motile and pathogenic, the other was non-motile and non-pathogenic. All attacked glucose, failed to liquefy gelatin, and did not produce indol. The organism isolated by Mühleus was like that of Miller: actively motile and somewhat larger than *Sp. cholerae*. No further description was given. The spirillum isolated by Goadby was very fully described by him. In general it resembled the other cholera-like vibrios.

It is evident, from the above, that a number of vibrios (both aerobic and anerobic) occasionally occur in the mouth, but as yet little more than the fact that someone has succeeded in isolating them is definitely known. The description of the spirillum isolated by Mühleus, for example, is so meagre and can so readily be applied to any comma-form, that it is impossible to compare his form with those reported by Repaci. These organisms are at best so difficult to differentiate that they must be studied carefully and systematically, and only a series of such investigations will ultimately prove of value in determining the microbic conditions of the mouth cavity and the teeth proper. It is not altogether improbable that the so-called mouth spiral form is not specific for the mouth but is derived from water.

Trichomycetes of the Normal Mouth. This group of higher bacteria seems to be especially characteristic of the mouth, and the abundance of its representatives is a fair index of the condition in which the teeth are kept. Pobiedoniesz and Oshima found them in every mouth except those of toothless infants. Pickerill reports leptothrices in 68 per cent. of the cases examined. Other observers, notably Miller, Vincentini, Goadby, and Williams, have found them in normal mouths. Miller described two types which he classes in the genus *Leptothrix* but neither of which he was able to cultivate. Vincentini reports another variety of *Leptothrix*, also uncultivated, while Dobrzyniecki reports the cultivation of still another type of *Leptothrix*. In fact, any thread like form observed in the mouth has been classed in the genus *Leptothrix*, so long as no branching was noted. The classification of this group is in a very unsatisfactory state, and it is quite obvious that we must adopt a common tongue if we are not to be drowned in a Babel of names all representing the

same thing. At the laboratory of the American Museum of Natural History the author has had the singular experience of obtaining the same organism under three different generic names—*Actinomyces*, *Streptothrix* and *Sporothrix*; while apparently different organisms came under the same generic name. It is quite likely that, following the lead of Miller, thread forms that were not *Leptothrix* were for convenience classed under that name.

Probably the best classification suggested thus far is that by Jordan, which follows:

| | | |
|---------------|---|--|
| Trichomycetes | { | <i>Leptothrix</i> —No branching. |
| | | <i>Cladothrix</i> —"False" branching. |
| | | <i>Nocardia</i> (<i>Streptothrix</i>)— |
| | | True branching; spores. |
| | | <i>Actinomyces</i> — |
| | | True branching; no spores. |

Dobrzyniecki was apparently the only one who succeeded once in growing in pure state a culture of *Leptothrix*, which he isolated from a root filling. He named this strain *Leptothrix placoides alba*, and described it as follows:

Leptothrix placoides alba. Morphology: Chains of bacilli forming tangled threads, showing also coccoidal and bacillary forms; stains by Gram and with ordinary dyes. Biological Characters: Aerobic, liquefying, non-motile bacillus. No spores observed. Characteristics of growth—Agar-streak: Raised, clear, cartilaginous mass of isolated colonies in 48 hours; in 8-10 days they flow together and may be lifted with platinum needle. Gelatin plate: in 48 hours, minute, raised, white colonies composed of masses of threads; in three days the gelatin is liquefied.

The other forms reported are *L. innominata*, by Miller; *L. racemosa*, by Vincentini; and *L. buccalis*, by Vignal. They have been observed merely in stain preparations and may or may not be true leptothrices. The *L. buccalis* of Vignal appears, from the meagre description, to resemble the *B. buccalis* (Miller). There is nothing to prove the contrary, since these bacteria are highly pleomorphic and may readily present different appearances under diverse conditions. *The only criterion for the proper*

differentiation of types is the isolation and study of the morphological and biochemical characters of the organisms.

Miller also reported a type which he named *Strept. buccalis*, which was isolated and described by Goadby. Since a complete description is given by him it is hardly necessary to repeat it here.

From the summary presented above it is evident that our knowledge of the microorganisms of the mouth is not based on thorough systematic investigation, but on isolated reports by a number of individuals interested rather in some specific types of bacteria than in the flora of the mouth as a whole. As a result, our knowledge of the relationship of the various types found, their importance and significance, is vague and incomplete. We know a great deal about some forms, such as the fusiforms, and exceedingly little about others. A considerable amount of work is necessary to determine the nature, relationship and relative abundance of the different organisms in the normal and diseased buccal cavity, before we can undertake an exhaustive study of the rôle of these invaders, singly and in combination, in the disturbances that result from their activities.

3. **Bacteria related to Dental Caries.**—Theories of disease and its causation are generally affected by the predominant mode of thought at the time they are formulated. This general principle is well illustrated in the case of dental caries. The main theories purporting to explain the etiology of this affection fall into definite chronological periods. Thus, first came the "stagnation" theory, dating back to the 5th century B. C. and Hippocrates, and still finding vogue in the middle of the 18th century (Bourdet, Bell). Then came the phenomenal development of the science of chemistry at the end of the 18th and the beginning of the 19th century, and Pasch, Becker, Ringelman and others brought forward the purely chemical theory of caries, which found wide acceptance at the time. Caries was considered to be a chemical decomposition of the teeth by means of acids formed in the destruction of food particles.

This was followed by the physiological theory of "inflammation," promulgated by Thomas Bell in 1835 and later (1886) by Heitzman and Boedecker. "There occurs a primary inflammation in dentin . . . running its course, . . . and leading, as all inflammatory processes do, either to a new forma-

tion or destruction by suppuration. Inflammation causes first a solution of the lime salts and then a liquefaction of the basic substances."

With the discovery of parasites as causal agents of disease, in the middle of the last century, Klencke (1850) came forward with a report that he discovered a protococcus which liquefied dentin and which he considered the cause of caries. Then came the epochal discoveries of Pasteur. Following in his footsteps, Leber and Rottenstein (1867) formulated the chemico-parasitic theory of caries; and were followed by Milles and Underwood who, for the first time, presented bacteriological proof to substantiate this theory.

The man who did most in support of the parasitic theory of caries, and at the same time dealt a death blow to the other theories, was Miller. A pupil of Koch, and stimulated by the wonderful discoveries of his master, Miller conducted an extensive series of investigations on the bacteriology of the mouth in general and of caries in particular, and became the "father" of dental bacteriology. The theory, as enunciated by him is as follows: "The enamel is decalcified by acids elaborated by bacterial fermentation of the carbohydrates in the mouth. The bacteria now enter the softened tooth and destroy it by their ferments." This is, in general, the accepted theory of to-day, though it fails to answer a number of important questions. Immunity to caries, localization of caries, sudden halt in the process and eventual repair are questions that remain open and are not accounted for by this theory.

Subsidiary theories have been introduced, but in the main the hypothesis of decay as formulated by Miller holds the arena to-day. Kirk (1914) advanced the hypothesis that bacteria penetrate the enamel and ferment sugar from the blood plasma, thus liberating acid which dissolves enamel from the inside. Baumgartner (1913), from a study of a series of histological preparations, suggested that primary caries is not a chemical but a purely parasitic process. He calls primary caries a streptomycosis. According to him streptococci enter the interprismatic spaces, and disintegrate the interprismatic material, thus destroying the enamel. They then burrow further, and penetrate the dentin and eventually reach the pulp. This appears to be a rather fantastic

explanation and illustrates the facility with which theories may be conceived.

Miller's studies on the bacteriology of caries can, however, be considered only as the great work of a great pioneer. Like other pioneers of science, he accomplished wonderful things with the crude instruments and methods at his disposal. But his work was nevertheless incomplete considered from the point of view of modern bacteriology, and a revision of the subject is not only desirable but highly necessary. Since Miller's work an important contribution has been made by Goadby. But, like Miller, Goadby failed to pay any attention to the mouth anerobes. In 1905 Rodella published an interesting paper in which he claimed that anerobes are the cause of dental caries. His work has not hitherto been confirmed. Recently Kantorowicz published an extensive bacteriological and histological study of caries, in which he confirms in the main Goadby's findings but makes no mention of Rodella's work. The published records of these few observers comprise the important contributions to the subject of the bacteriology of caries.

Neither Miller nor any of the subsequent workers has succeeded in finding an organism specific for caries. All of them report, however, the presence of certain types which they claim are always observed in carious teeth. Miller, Goadby, Sieberth, and Kantorowicz lay stress on the organisms that produce lactic acid, the last three considering the streptococci of the greatest etiological significance. Rodella, as stated above, emphasizes the importance of putrefying anerobic forms like putrificus, butyricus, and the like, which he found in saliva. The unavoidable objection to the work of the former investigators is that they made no attempt to test for anerobes and that streptococci, even if not very abundant, outgrow the other organisms so rapidly that they might appear to be the most important. Rodella's work on the other hand is not carefully controlled and consists merely of an examination of saliva and not of decayed dentin.

To one acquainted with the rich flora constantly present in the mouth it must appear obvious that the types isolated, and hence the types considered of most significance, will depend very largely on the methods employed. Two workers using the same technique will undoubtedly find approximately the same types of

organisms. The exact opposite may be the case when two workers or even the same workers employ different methods. Both results are correct but neither tells more than a part of the truth, and in neither case is there a determination of the relative importance and prevalence of the types reported.

Miller mentions six organisms isolated by Vignal and Gallippi, who examined 18 cases of decayed teeth. The meagerness of the description can be noted from the following summary:

- (a) Short, thick bacillus, 1.5 μ long and about as thick; liquefies gelatin in 3 to 4 days; colonies white to opaque.
- (b) Long bacillus 3 μ x $\frac{1}{2}$ μ , spreading colonies.
- (c) Similar to (b); square ended; does not liquefy gelatin.
- (d) Small, thin bacillus, almost like coccus; yellow trail in stab; liquefies gelatin.
- (e) Bacillus, rounded ends; liquefies gelatin.
- (f) Large coccus.

Such descriptions tell nothing more than that bacilli apparently predominated in the decayed teeth examined by these authors. What types they were is conjectural.

Goadby divides the bacteria of caries into liquefying and non-liquefying groups, and also according to whether they are derived from deep or superficial layers. He finds, strangely enough, the acid bacteria predominant in the deep layers and the liquefiers in the superficial layers.

| | | | | |
|--------------------|---|------------------------|---------------|---|
| Deep layers . . . | { | Acid formers | { | <i>Str. brevis</i> <i>B. necrodentalis</i> <i>Staph. albus</i> |
| | | Liquefiers | not isolated. | |
| Superficial layers | { | Acid formers | { | <i>Str. brevis</i> <i>St. albus</i> <i>St. aureus</i> <i>S. lutea</i> <i>S. aurantiaca</i> <i>S. alba</i> |
| | | Liquefiers | { | <i>B. mesentericus ruber</i> <i>B. mesentericus vulgatus</i> <i>B. mesentericus fuscus</i> <i>B. mesentericus ferrus</i> <i>B. gingivae pyogenes</i> <i>B. fluorescens liquefac. motilis</i> <i>B. subtilis</i> <i>B. proteus</i> <i>B. plexoformis</i> |

Practically all the liquefiers are members of the hay-bacillus group, which are always present in the mouth as well as everywhere else, and can hardly be claimed to have any special significance.

Dobrzyniecki reports a series of organisms agreeing with some of those found by Goadby. He isolated the following:

B. gangraenae pulpalis (*mesentericus*?)

St. aureus

Str. pyogenes

S. lutea

St. albus

Kantorowicz, who followed Goadby's technique rather closely, reported results closely agreeing with those of the latter. He finds in the deepest layers streptococci, non-liquefying staphylococci, and two types of bacilli—one very similar to Goadby's *B. necrodentalis*. He concludes that in the deepest layers liquefying forms are not present. The streptococci are considered by him to be the main cause of caries.

Rodella, using a different technique, claims that *B. putrificus* and *B. phlegmones* are always present in carious teeth. Both of these are strictly anerobic organisms of putrefaction. His view is that the butyric acid-producing anerobes initiate and complete decay of teeth.

Which of these authors is right and what actually is the flora of carious teeth? The role of *oxygen* in regulating the growth of these organisms may afford a clue to the answer. There is progressively less oxygen in a carious cavity, from the superficial layer of the decayed mass inward. It may be impossible for aerobic liquefiers to thrive in the deepest portion of the carious mass, with consequent diminution in the number of these types, but *anerobic* and facultative anerobic cells may alone be active in the "deep layer," thus accounting for the contradictory findings in this relation. Anerobic forms of importance may have failed of detection in carious teeth, in the work of our predecessors, because of their failure to impose suitable conditions of cultivation. A new aspect of the influences operative in dental caries may be presented from this standpoint.

We shall return to this phase of the subject in a succeeding section of this report.

Bibliography.

- *Babes: Spindelformige Bacillen, Kolle and Wasserman, 1907, v (Leipzig).
Bachelet: *Revue générale de l'art dentaire*, 1908, xii.
Barrett: *Dental Cosmos*, 1914, lvi, p. 948.
Bass and Jones: *Jour. Amer. Med. Assoc.*, 1915, lxiv, p. 553.
*Baumgartner: *Ergebnisse d. ges. Zahnheilkunde*, 1910, ii, p. 729.
*——— *Wiener klin. Woch.*, 1913, xxvi, p. 178.
*Beitzke: *Cent. f. Bakt.*, 1904, xxxv, p. 1.
Dobrzyniecki: *Cent. f. Bakt.*, 1897, xii, p. 833.
*——— *Ibid.*, 1898, xxiii, p. 670.
*Doefflein: Lehrbuch der Protozoenkunde, 1911 (Jena).
*Ellerman: *Cent. f. Bakt.*, 1904, xxxvii, p. 314.
*——— *Cent. f. Bakt.*, 1907, xlv, p. 160.
*Freund: Dissertation, 1893 (Erlangen).
*Gerber: *Cent. f. Bakt.*, 1910, lvi, p. 509.
——— *Münch. med. Woch.*, 1911, 58', p. 452.
——— *Virch. Arch.*, 1912, ccvii, p. 148.
*Goadby: The mycology of the mouth, 1903.
——— *Lancet*, 1906, p. 1281.
Hugenschmitt: *Dent. Cosmos*, 1896, xxxviii, p. 797.
*Hoffman and von Prowazek: *Cent. f. Bakt.*, 1906, xli, p. 741.
Jordan: General Bacteriology, 1910.
*Kantorowicz: *Erg. d. ges. Zahnheilkunde*, 1912, iii, p. 49.
Kartulis: *Ztschr. f. Hyg. u. Inf.*, 1893, xiii, p. 9.
Kirk: *Dental Cosmos*, 1914, lvi, p. 1.
*Krumwiede and Pratt: *Jour. Inf. Dis.*, 1913, xii, p. 199.
*——— *Ibid.*, 1913, xiii, p. 438.
*Lewkowicz: *Cent. f. Bakt.*, 1904, xli, p. 153.
Leber and Rottenstein: Ueber d. Caries der Zähne, 1867 (Berlin).
*Miller: Die Mikroorganismen der Mundhöhle, 1892 (Leipzig).
Milles and Underwood, *Trans. Int. Med. Cong.*, 1881.
*Mühlens: *Deutsche med. Woch.*, 1906, xxxii, p. 797.
*——— *Cent. f. Bakt.*, 1908, xlviii, p. 523.
*——— and Hartman: *Zt. f. Hyg.*, 1906, lv, p. 81.
*Noguchi: *Jour. Exp. Med.*, 1912, xv, p. 81.
*——— *Ibid.*, 1912, xvi, p. 194.

- *Oshima: *Arch. Kinderheilk.*, 1906, xlv, p. 21.
*Ozaki: *Cent. f. Bakt.*, 1912, lxii, p. 76.
*Pickerill and Champtaloup: *Brit. Med. Jour.*, 1913, p. 1482.
Plaut: *Cent. f. Bakt.*, 1907, xlvi, p. 310.
——— *Deut. med. Woch.*, 1894, xx, p. 920.
*Podbielski: *Cent. f. Bakt.*, 1891, ix, p. 617.
Prowazek: *Arb. a. dem kais. Ges. Amt.*, 1904, xxi, p. 42.
*Repaci: *Compt. rend. soc. biol.*, 1909, lxvi, p. 639.
*——— *Ann. de l'Inst. Past.*, 1912, xxvi, p. 537.
*Rodella: *Arch. f. Hyg.*, 1905, liii, p. 329.
Sanarelli: *Cent. f. Bakt.*, 1891, x, p. 817.
Schaudinn and Hoffman: *Arb. d. kais. Ges. Amt.*, 1906, xxii, p. 527.
*Scheff: *Handbuch der Zahnheilkunde*, 1910, i.
Tunncliff: *Jour. Inf. Dis.*, 1906, iii, p. 148.
*Vignal: *Arch. de physiol*, 1886, viii, p. 325.
Vincentini: *Bacteria of sputa, etc.*, 1902 (London).
Vincent: *Ann. de l'Inst. Pasteur*, 1896, p. 492.
Weaver and Tunncliff: *Jour. Am. Med. Assoc.*, 1906, xlvi, p. 482.

* The most important contributions are indicated by asterisks.

THE FORSYTH DENTAL INFIRMARY

Addresses by THOMAS ALEXANDER FORSYTH and HAROLD DEW. CROSS, D.M.D., to the First District Dental Society, S. N. Y., March 1, 1915.

Mr. Forsyth—Mr. Chairman and Gentlemen: At the outset let me be perfectly frank in saying that when the subject of this visit was first broached I demurred a bit, which is quite natural, I think you'll agree, for one whose time is spoken for so completely weeks in advance, at times, it seems, and with duties that are as varied as they are arduous. But our very good friend, Doctor Davenport, at the time of the dedication of the Forsyth Dental Infirmary, exacted a promise that I make this visit, and, with but little thought then but of that memorable event in the history of our institution, I declared my willingness to come to New York, if circumstances permitted, after I saw that the doctor would not take "no" for an answer. Since then he has been so persistent (an excellent trait, by the way, my friends), and Doctor Cross, our director, so resourceful in reminding me of the appointment, that really I have not been allowed to think for a moment of sending the customary "regrets," and so close the incident.

So, you see, I have been perfectly frank, and now I'll be as truthful in adding that I am pleased—delighted, I might say—in being one of your number here this evening. I have enjoyed immensely all that has gone before, and am confident will be as interested and pleased with what follows.

And now to the subject: *The Forsyth Dental Infirmary for Children*. As the majority of you know, this institution was dedicated on the 24th day of last November. The first thing that strikes the general observer is the simplicity of the building's architecture, the firmness with which it has been moulded, so to speak—massive, substantial and still, withal, beautiful! And truly it is beautiful, and we, of the Infirmary, speak of its beauties with pardonable pride; those who have seen the structure I know will say. Placed in that garden spot of old Boston, the

Back Bay or Fenway as it is called, it enhances the architectural, horticultural, as well as natural, attractiveness of the surroundings wonderfully!

But we did not stop at outward appearances, my friends; for, you know, these at times are most deceptive. In the interior the Infirmary sets a standard for sanitary construction, excellence of appurtenances and completeness of equipment that is actually years ahead of its time. The many, many months that the trustees gave their thought and attention to the details of construction and equipment are shown with almost every glance while the visitor is in the building. We have not built for a day, a year, nor a decade; but, gentlemen, for all time; for, as you know, this is a memorial building; and this fact we never allowed to escape our mind in our years of planning. When I tell you that already we are caring for some three hundred little ones daily, you will think it almost incredible. Later, as time passes and our organization becomes more firmly welded, and so runs with a bit more freedom and uniformity, which time alone can accomplish, we hope to bring this number up to one thousand a day. This includes treatments of teeth and care of tonsils and adenoids. But more of this you will hear from our director, Doctor Cross, who is better qualified to say just what we have done, are doing and hope to do as the years pass on.

What prompted this foundation? how did the idea originate? for, you know, the Forsyth Dental Infirmary is an institution distinctly new and novel—the only institution and benefaction of its sort, we are told, in the world!

It was first conceived by my brother, James Bennett Forsyth, who died six years ago. In fulfilling his wishes, my brother John (who has since passed away) and I wished to erect the building in memory of our two deceased brothers, James Bennett and George Henry Forsyth. It is therefore, I repeat, essentially a memorial foundation; and this was never lost sight of during the time of the institution's erection and equipment. We have built and built well. Personally, I had seen so many buildings handicapped in the good they were doing by the addition of "ells" to the original structure—the beauty that held the admiration and praise in former years now lost by changes here and

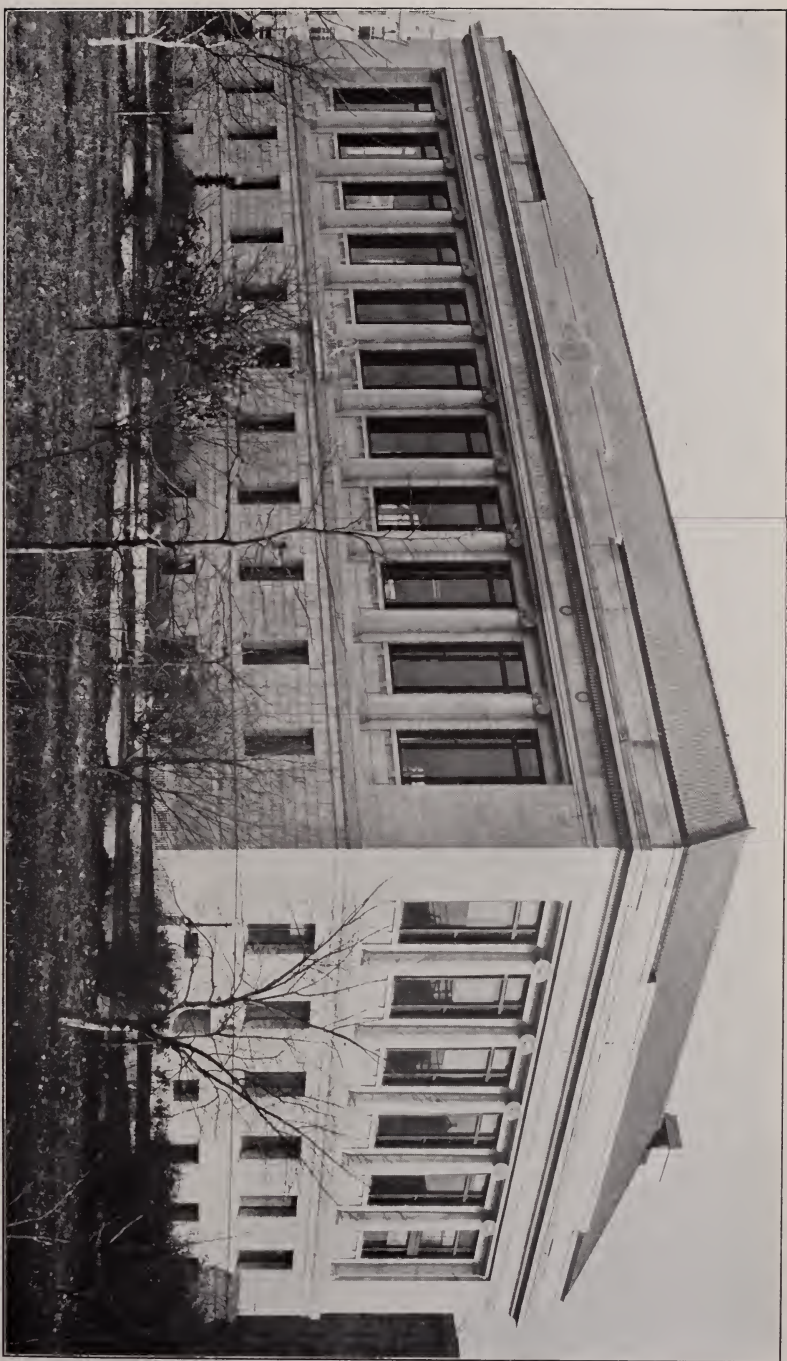


FIG. 1.—The Forsyth Dental Infirmary, Boston, Mass.—Front View



FIG. 2—Exterior, Showing Main Entrance

there, both interior and exterior—that we guarded against such a contingency. The trustees built with an eye always for the future, anticipating the growing needs of such an institution as ours; and generations will have passed ere it can be truthfully said that the present Forsyth Infirmary cannot adequately house and care for ALL of the eligible patients of suitable age of Greater Boston. And this, my friends, is as it should be.

And what a source of gratification it has been to me personally to note the good that the Infirmary is doing day by day! With the many patients we have already treated, it seems incredible that but a few weeks ago there was no such institution as ours; no such harbor of relief for the little ones in their suffering; no such refuge in their pain. If you could note the look of whole-hearted thankfulness, of deep-seated appreciation, that illumines their faces as they leave their chairs after a treatment, you, too, would feel, as I have so many, many times, immeasurably thankful for being granted the privilege of working a good that, undeniably, was needed.

Humanity seemed to cry out for the establishing of such a clinic as ours. To the time of the opening of the Forsyth Infirmary, the scattered few-chair clinics were hopelessly inadequate to cope with the work that beset them. Our institution means that no deserving ones in our community need go without proper treatment and attention to their teeth, adenoids and tonsils.

Of the Forsyth Infirmary “distinctiveness,” so-called, Doctor Cross, who follows me, I understand, is better able to speak than I. Of our Surgical Department, our X-ray equipment (than which there is none better in existence), our Research Department, our Visiting and Permanent Staff Rooms, our Lecture Room and its purposes, our Amphitheater and its uses, the Children’s Room and its library, aquarium—beautiful decorative and instructive wall tiles, and the many other salient features of the Infirmary, no doubt, he will speak.

And now I believe I have spoken at sufficient length. In closing, I wish to thank you for the invitation extended Doctor Cross and myself to be present this evening. That we both appreciate it can be better displayed in the warm welcome that

awaits every member of this honorable society who knocks for admittance at the doors of the Forsyth Dental Infirmary, and the courtesy and consideration shown him in his visit to this latest addition to Boston's large number of public foundations that are *truly* benefactions in deed as well as in word.

My friends, I thank you for bearing with me. Figuratively, at least, I shake you all by the hand. In the warmth of your handclasp I know the Forsyth Infirmary has your genuine friendship and heartiest co-operation, and that is my greatest desire.

Mr. Chairman and friends, I thank you.

Doctor Harold DeW. Cross—Mr. Chairman and Members: The *spirit* which inspired the Forsyth foundation, the *field* which it will serve, and the *magnitude* and unselfishness with which it has been carried to completion, marks it as the most wonderful philanthropy which has ever been conceived. Founded by John Hamilton and Thomas Alexander Forsyth in memory of their brothers, James Bennett and George Henry Forsyth, the work has been carried to completion under the wise guidance of Thomas Alexander Forsyth, assisted by the Board of Trustees.

This institution is based on the recognition of the fact of the inherent right of a child to physical as well as mental development, and is the first attempt to provide for the necessary buccal treatment on a suitably large and comprehensive scale.

It is the duty as well as the purpose of the Trustees, so to plan and conduct the operation of the Infirmary, to insure the wise expenditure of the magnificent endowment for the purpose for which it was intended: to give deserving children clean and healthy mouth conditions.

As the problem of arranging the building and providing the equipment was new and required much thought and study, and as there was no precedent, nothing to copy; so, in planning the routine and system of operating the institution, again the Trustees had to go into a new field and create methods to fit the needs, and these problems still are, to a certain extent, new and difficult. The magnitude of the undertaking and the methods adopted create in themselves problems requiring the most careful consideration, and the task of putting them in operation is one of considerable difficulty. For instance, the mere getting to-

gether and the separating at the chair of the operator, the child, the supplies and the instruments 300 times a day requires that a large number of persons work in such unison and regularity as is required in a well systematized factory, operating under modern efficiency methods, where the failure of one individual to meet the time and quality requirements means upsetting the whole plan.

The Forsyth Dental Infirmary, among other things, is particularly fortunate in having, through the foresight and magnanimity of its donors, an endowment, in addition to the cost of the building and its equipment, sufficient to meet the needs of the running expenses. For this reason, and because it is primarily intended to benefit the deserving child of small means, a fee of only five cents is charged for a visit and treatment in any or all of its clinics. This fee, small as it is, is intended to allow the child to retain its self-respect, and not to pauperize him or compel him to receive absolute charity. The fee also serves, as it always does, to create more interest in the work, and to stimulate more appreciation in the service rendered.

Much has been said in regard to the building, the equipment and the plans of the Infirmary; but up to now very little description has been given of the actual operating conditions; that is to say, in regard to the methods of caring for the children, the instruments, the supplies and arrangement of the work for the operators and employees, and of how the various clinics are conducted.

The Infirmary has been open two months, but it is not yet running anywhere near full capacity; for only about one-half of the present chairs are in use. The average number of children treated has been approximately 300 per day; 4,800 different children have been treated and 2,500 have been dismissed, with an average number of operations per child, including cleaning, extracting and fillings, of 6.4; and 28,000 operations have been performed.

Public opinion in Massachusetts, several years ago, led to a requirement of physical examination of school children; and consequently the conditions in Boston are particularly favorable in regard to the interest and the training given in the schools in

mouth hygiene; for, under the direction of the School Board, the Department of Child Hygiene, with its able school nurses, have been working on the teeth problem for children for a number of years, and we find the field for a curative and prophylactic clinic already established and waiting. This is quite different from the conditions in some cities, where it is necessary, before establishing a clinic, that sufficient interest be aroused to warrant the establishment of it.

The Forsyth Dental Infirmary does not send dentists into the schools to make examinations or to select children for its services, but exists only as a clinic to which *all* children are admitted without reference to race, creed or color; and they are all given the benefits of its wonderful facilities. Fifty per cent. of the children now being treated come to the Infirmary regularly under the care of the school nurses from the various districts of the Public Schools. Reservations are made for definite numbers of children, who are selected by the nurses as being deserving of the benefits of the clinic and needing attention for tooth defects. When the Infirmary was opened reservations were made for public school children, and until things were somewhat systematized only this definite daily number were admitted.

Something has been said in regard to the inadvisability of centralizing the plant of the Infirmary, some even claiming that it would be impossible to get the children to the Infirmary from other parts of the city; but the fallacy of this was proved on the first morning the clinic was opened, when about two hundred children were waiting to be admitted; and the number has increased fully as rapidly as it has been possible to develop the facilities; not but what the facilities will be ample when in full operation, but during the formative period, while the system and routine is being worked out and until the full number of operators are employed, the applicants have been somewhat in excess of those who could be accommodated.

In regard to the requirements which are necessary for a child to be admitted to the clinic; the first is the age limit, which is up to the sixteenth year. So far there has been no limit placed on the locality from which children may be received; and it is not proposed to do so unless the demands are so much in excess

of the facilities for treatment as to demand it. The financial circumstances of the family, however, is a requisite of prime importance; and, stated in a general way, no child who is able to obtain the services of a private dentist is eligible to admittance to the Forsyth clinic. Of course, many conditions may be considered under this heading outside of the weekly income of the family; and these are all taken into consideration. It is proposed that the institution shall work in perfect harmony with the dental profession so as not to receive for treatment a child from the private practice of any dentist; and the profession is urged to report any such cases known to be receiving treatment at the Infirmary.

A child to be received into the clinic must first present an application card, which is properly filled out, bearing the recommendation as to his worthiness from some responsible person or society. One must pass the questioning of the admitting clerk, first, if he has a family physician or dentist; secondly, in regard to the weekly income and the number of persons in the family. If these are answered satisfactorily, and having been admitted and received treatment, there then arises any doubt in the mind of the operator in charge of the case, or any word is received from family physician or dentist, the case is placed in the hands of a social-service worker employed by the Infirmary, who, after looking up the case at the Bureau of the Associated Charities, visits the family, if necessary, and thoroughly investigates the case and makes her report in accordance with the result; and if conditions are found which warrant, the treatment is discontinued.

All this makes it possible for the Infirmary to give the benefits of its clinic only to deserving children; and it also protects the dentist from any invasion of his own practice. Rarely cases coming through school nurses or charitable organizations require any further voucher, for in such instances the actual home conditions are well known to those referring the child. Of course, following this method of admittance, instead of the clinic taking away from the private practitioner, it will rather serve greatly to increase in a few years the amount of dentistry which will be done in the vicinity of Boston, for it has been said, and probably

is true, that the large number of teeth that are saved by an institution of this sort will in itself create many times the amount of private practice which the institution may, in the first instance, divert from private practice.

The staff of the Infirmary is made up of dental and medical men working together on mouth and associated problems.

The dental staff is composed of interns selected by competitive examination, and of a Consulting and a Visiting Staff. The interns, of whom there are fifteen employed for full time and about thirty for one-half time, make up the present Permanent Staff, while the Visiting Staff is now composed of about fifty men. There is a Nose and Throat, an Extracting, an Orthodontic, an Oral, Surgical, Research, Anesthetizing and Radiographic Staff, with consultants in the departments of surgery, otology, roentgenology, physiology and orthodontia.

As the Forsyth Dental Infirmary is the first institution of its kind in magnitude, so it offers the first opportunity for dental intern service in a purely dental institution. Dentistry up to the present time has not required any service intermediate between graduation and the time of beginning practice; but in the medical profession, this type of service is looked upon as not only desirable, but essential. Therefore, if an opportunity is offered for the dental graduate to take up an intern service in an institution where he can obtain the privileges of a variety of clinics, he will, after a year or two of such service, become much better fitted for practice. This is what the Infirmary expects to provide in the way of post-graduate work. The opportunities for wide experience which this type of service offers ought to attract picked men from the graduates of dental schools in all parts of the country, and will soon result in training a group of experts in the treatment of all phases of child dentistry. Incidentally, these positions will be a means of establishing the operators in private practice, as not only will they have the stamp of approval of the Infirmary, as a guarantee of their fitness, but also as patient applicants, too well-to-do to receive treatment at the clinic, will be referred to the members of the staff.

It is not in the province of the Infirmary to do undergraduate teaching except as is done in all hospitals, by giving students



FIG. 3--Registration Desk



FIG. 4--Examining Room



FIG. 5—Infirmary

the privileges of seeing operations performed and of following the various clinics. Students from any dental school are admitted freely to all of the clinical advantages of the Institution.

There is an important department or phase of the work which has not as yet been started, one which will be equally important to that of the operative clinic; namely, the lectures on oral hygiene, or teaching the child to take interest in his teeth and how to keep them clean. This work will be accomplished by the aid of a moving-picture machine and stereopticon, and will be under the care of persons selected for their fitness, and will probably eventually be kept in continual operation during the hours that the children are in the Infirmary. This will take up all the phases which may be of interest to the child, from the reason why the teeth erupt to instructions as to the proper way of brushing them, including also much of general, as well as mouth, hygiene.

You may be interested to start with a child entering the children's door and follow that child through the various departments. He first reaches the coat room, where his coat and hat are exchanged for a numbered check with a chain, which may be placed around the neck for safe-keeping; this check also serves to indicate the order of arrivals. Following along, the child enters the Children's Waiting Room; this room, 75 x 30 feet, is completely covered with tiles on the floor, walls and ceiling, and has a special pictorial tile border around the four walls, and an aquarium in the center of the floor. In this room are small chairs and tables, children's books and games. Here the child goes to the registration desk, passes in its application card, and receives in exchange a registration blank, to be taken to the appointment clerk on the floor of the Infirmary, which is reached by a special stairway. Here the registration blank is exchanged for a clinical chart, and the child deposits five cents; from here he is conducted to a vacant chair or to the Extracting Room, to the Nose and Throat Department, or the X-ray Room, as may be necessary. After the operation has been completed, the child returns to the appointment desk and, passing out on the other side, exchanges the clinical chart for an appointment slip, passes downstairs to the Children's Room, to the Check Room, and out.

If, however, extracting or any surgical work has been done, the child returns to the Coat Room by another way, so that he does not come in contact with those still in the Waiting Room. The calls to the appointment desk are made just previous to the time the child is wanted, so that whatever time he spends in waiting is in the large Children's Waiting Room, located well away from the operating rooms and in the opposite wing of the building.

All appointments and records are made and kept by a clerk, the appointments being kept individually by case number for each child. The card files are so arranged that the registration, clinical charts, record of the operations, the dismissed cases, the active cases and the appointments are kept, to be available when needed. All cases pass the appointment desk and receive a case number, regardless of the department to which they are to be sent to receive treatment.

A method of filing the dismissed cases is adopted, which permits of following up until the age limit is reached, so that a case once registered remains under treatment ordinarily until the sixteenth year, and is notified to return for treatment at definite times. This means that ultimately it will be necessary to have about ten years of active cards on file all the time.

A sterile tray and instruments are supplied for every patient, consequently sterilization must be accomplished on a large scale. All of the handpieces and right angles are boiled after each operation in a solution of green soap, while the other instruments placed in the tray are baked in an oven in dry heat, at a temperature of 325 degrees, for three hours. These large sterilizing ovens have a capacity of one thousand trays of instruments, about 300 of which are in use at the present time. This uniform set of instruments—70 in number—includes all those necessary for an ordinary plastic operation, including excavators, burs, handpieces, right angles, R. D. Clamps and forceps, cement slab, etc. The supplies are also placed in trays, and include filling materials, medicines, napkins, root-canal points, temporary stopping, etc.; enough for one service of four hours, which may cover the treatment of eight different patients.

To carry out the purposes of the institution, the following departments have been established: Operative Dental Clinic, Ex-

tracting, Orthodontic, Radiographic, Oral Surgical, Oral Hygiene Lecture, Nose and Throat, Research and Anesthetic; also Surgical and Physiological, with consultants. The courses of these various departments, in one institution under one management, will, as soon as they are thoroughly established, together with the great amount of clinical material, offer unusual facilities for post-graduate work under such conditions as have never before been possible. Additional interest is to be provided for the intern service by arranging to have eminent men in the profession give a series of clinics and lectures, distributed throughout the year, on various new topics of interest; and the operator's time is so divided that, in sections, the advantages of assisting at and observing these, as well as the various regular clinics, is made possible.

The department of Oral Surgery will include all cases ordinarily coming under this heading, such as necrosis, fractures, alveolar abscess, root amputations and other surgery related to the teeth.

The Research Department so far has adhered to routine work for diagnosis, including examination of cases by smears, cultures, examination of saliva and urine, Wasserman and blood tests in connection with the Operative Dental and Nose and Throat Clinics. The more pretentious research work will be begun soon. In this laboratory is a trained technician in the employ of the Infirmary; while in addition an opportunity will be offered to those in the profession, who are competent, to do reasearch work, where the necessary apparatus and material will be at their disposal.

The Nose and Throat Clinic, which is now performing about ten operations two days a week, is not carried on as an ordinary nose-and-throat clinic operating on all cases promiscuously, but entirely from the standpoint of the influence of the tonsils and adenoids on maxillary and facial development, taking especially cases necessary to follow up in connection with the orthodontic work. All cases, however, before they are dismissed from the operative clinic for any period of time, pass a routine examination both in the Nose and Throat and the Orthodontic Departments. This department does not ordinarily deal with the ear

or glands unless they are closely involved with the throat or teeth, but includes practically all surgery of the soft parts of the throat or mouth.

The Extracting Department is in charge of a man who spends five hours every day, and it is carried on by a staff of sixteen men, serving one-half a day each, every two weeks, assisted by one or two interns every day; nitrous oxide and novocain are principally used as anesthetics. Of course, as is to be expected in the beginning, most of the work consists of cleaning up neglected mouth conditions, and the greater part of the work has to do with the first permanent molar. Fortunately, this clinic has a little advantage over some in being able to utilize an anesthetic in all cases where it is desirable; and the child's freedom from pain does not depend on his having money enough to buy this necessity.

The Orthodontic Department has a staff man present four hours a day during five days of the week, and is assisted at the present time by about twenty interns each day. This number will be increased as rapidly as possible, which will enable the department to carry on a fairly large number of cases, particularly so as more attention will be given to the younger ones, and, by keeping in touch with all the patients of the Infirmary, will be able to carry out a large amount of preventive work among all of the children receiving treatment.

X-ray work is employed about as would be done in any first-class practice; that is, in all cases where advantage is gained by recourse to the radiograph. It is, of course, routine for unerupted teeth, alveolar abscess and difficult root-canal fillings. This latter is being followed out now in the majority of root treatments before and after fillings.

Children are admitted and assigned to the operative dental clinic without any preliminary examination and charting of cavities, emergency cases being afterward taken to the extracting room. A *thorough* examination, however, is made for the *dismissal* of the completed case, and accomplishes all and more than would be done by making it in the beginning, and at a very much less consumption of time. The omission of the preliminary examination does not mean that the work proceeds in an unorderly



FIG. 6.—X-ray Clinic



FIG. 7—Extracting Clinic



FIG. 8—Nose and Throat Clinic

way, for the operators begin their part in a systematic manner, as follows: first, by relieving pain; second, giving a complete prophylactic treatment; third, any tooth especially needing attention is cared for; and fourth, beginning with tooth No. 1 and continuing in order, each tooth is given the necessary attention. This carries the operating along by a definite system, and makes it possible for one operator to take up the work where another has left off, without there being any uncertainty in regard to what has previously been done. It is, however, our practice not to transfer a case from one operator to another unless absolutely necessary, believing that the same operator can ordinarily accomplish much more by following the case to completion himself.

The clinic is open continuously from 9 a.m. to 5 p.m., the half-time giving four hours and the full-time operators seven hours' service, while the Visiting Staff average four hours' service a day.

In order to have the clinics present as orderly an appearance as possible, and to fulfill the requirements of modern sanitary ideas, all of the operators are clothed in white, the permanent staff wearing complete suits, while a surgical gown is worn by the visiting men. There are three women dentists now on the staff, and, as this type of service ought to be particularly attractive to them, there will probably be more later. The patients are all covered by a large cloth bib or apron, which gives protection to the operator as well as to the child.

The time of the operators has, as far as possible, been conserved for the purposes of actual operating; the carrying of instruments and supplies to and from the chair, conducting the patients and making records, are therefore all arranged to be done by an employee, so that the operator can devote practically all of his time and interest to his particular work. On the clinical charts, all that it is necessary for the operator to do is to make an outline on the printed diagram and indicate in the proper column, by abbreviations, the operations which he has performed.

General uniform methods of operating are required, such as shaping of cavities, the kind of fillings made, carrying on of treatments, canal fillings, etc., in order to insure a knowledge of what has been previously done in a certain case; and also that the in-

stitution may assume the necessary responsibility. Up to this time, however, no particular system has been devised which can be called peculiarly the Forsyth method of operating on children's teeth, as the clinic has been in operation such a short time, and practically all of the attention has been devoted to systematizing the general running of the institution, getting the machinery in operation, providing suitable instruments and supplies, and the necessary clerks and assistants in the various departments.

It is also too early to predict results or to make any definite statements in regard to just what will be accomplished; but, judging by what has been done so far, by dismissed cases and the required number of operations per child, it appears that the clinic will easily be able to do all, and more, than was originally proposed.

COLOR OF THE TEETH

BY DR. F. H. ORTON, PROFESSOR OF CROWN AND BRIDGE WORK,
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Although the mechanical part of crown and bridge work has been justly commended, yet it cannot be denied that something more than excellence of craftsmanship is implied in the many hyperbolical descriptions extolling the fineness of the work and its truth to nature. What is really implied in these descriptions is this: That crown and bridge work has passed beyond mere science; in fact, that it is an art. Do not let it be inferred that I intend to belittle in the slightest degree the mechanical ingenuity which has found expression in the evolution of the artificial crown; what I have to say has been suggested by the claims of dentists themselves.

If crown and bridge work already has a place among the arts, it is altogether fair to ask, what is its technique? What are its standards? I have only to phrase these questions, and they answer themselves immediately. I do not mean to suggest here that there are not favored individuals in the profession who are endowed with some special love for art and a perception of its more palpable beauties, who pick up in the course of time a great deal of empirical knowledge, working their way back to first principles through studies and reflections that should have been offered as a preparatory course for their work. My point is this: Whereas there is a technique, a code of procedure for the mechanical part of the work, which serves as a guide to the student of dentistry, there is no such guide for the higher aspect of the work—that aspect which gives us the right to consider the replacing of the natural crown by the artificial one as among the fine arts; all this is left entirely to the individual. It would be idle to deny that individuals have accomplished nothing; often, indeed, they have accomplished a great deal, but only as *individuals*. Each one who obtains any results in this field laboriously works out for himself his own theory and practice; and when he passes away, his art perishes with him. I need not in-

sist on the loss of effort caused by this method of working, nor upon what the profession as a whole loses by one person not being able to begin where another leaves off. It is as if all the knowledge that the first generation of men acquired should disappear with them, as if the new generation must begin again at the bottom. World-progress under such conditions would have been impossible. The word *civilization* would never have been born. Progress on the artistic side of dentistry is likewise impossible without formulating and codifying the experience of individual dentists. A manual of principles and rules of guidance must be drawn up. Future students ought to have it made possible for them to profit by the knowledge and discoveries of dentists who precede them.

Although I thus analyze the existing situation with respect to dentistry as a fine art, yet I do not assume to possess a knowledge of such compass as would enable me to formulate a course of study, even of the most elementary character, in this particular branch. Nevertheless, my years of endeavor in comparison with their puny results, and my discouragements as an instructor have made the formulation of some definite principles of art technique appear to be a permanent necessity. The thought has been many times driven home to my mind that under proper guidance, using the discoveries of those who have preceded me, or, of my contemporaries, it would have been very easy for me to have acquired long ago even more than that which I have painfully and imperfectly learned by experience alone. This paper is, therefore, not intended to be a treatise on technique; it merely expresses my individual theories, knowledge and convictions on one particular point.

It is agreed, I am sure, that crown and bridge work ought really to be an art. It is then proper and necessary to ask which one of the many definitions of art would best apply to it. Upon careful consideration I have found the answer most appropriately given in the trite but revealing epigram: "True art is to conceal art." In this epigram we also find described our difficulties and limitations. For we must reproduce nature exactly as we find her. Even her variations and imperfections must be copied. And right here our restrictions begin to make themselves felt.

The artist in oil or marble has more latitude than we have. It is always within his power to flatter a little. In more dignified phraseology, he idealizes nature. He finds her unfinished and imperfect. She has good intentions, of course, but as Aristotle said, she cannot always carry them out. We dentists, however, cannot take liberties with our art. If we adopt as our ideal motto: "True art is to conceal art," we must mean,—as we ought to mean,—that we are going to try to make a real imitation of nature, an imitation so perfect that nature herself would be deceived. In a word, we must compete with nature. Only when the observer cannot tell which is art and which is nature, can our work be considered wholly successful and artistic.

Such perfection of imitation inevitably implies an intimate study of nature. And indeed, the best artists of every period and of every department of art have developed upon this foundation. We, in our field, claim to be artists, but do we begin where we ought? Do we, in any complete sense, go to nature? Permit me to answer this question by asking another more concrete: If we studied nature carefully, instead of copying from each other, would we be satisfied to work with the conventionalized teeth which are furnished us by the manufacturer? We know that the bit of porcelain with which we make our crown is, as to characteristics, shape, and color, utterly unlike the human teeth. Rarely, indeed, can a porcelain be found which exactly fits, in all particulars, the case in hand.

It may be asked at this point: Why does not the manufacturer give us better teeth with which to operate? The answer is obvious: Because we do not require him to do so. He furnishes the profession with what is demanded, just as does any manufacturer. He is influenced in the production of artificial teeth by those shapes and colors which had the best sale the preceding year. And it is certainly not to be expected, in this unaltruistic age, that he will concern himself with a careful imitation of nature when dentists will unthinkingly take what is offered them. The product of the manufacturer is determined to a great extent by the large orders which are sent to him by the big advertising dental shops and laboratories. These shops order perhaps a hundred sets of teeth at a time. The point for us to note is that these

teeth are all of one shape and color. In a recent conversation with one of the heads of a large dental manufacturing company, I asked whether the company would be willing to furnish a new set of models. He answered immediately: "When the dental profession knows what it wants, we will supply the demand; we cannot do business on any other basis." Certainly, manufacturers cannot be blamed for not undertaking to educate us as to what we ought to demand in order to do really artistic work. The fault, obviously, lies not with them, but with dentists themselves.

Perhaps it would be well at this point to look for a moment at the porcelain facings furnished us by the dealer. I might discourse at length on their unnatural shape, but I shall pause only long enough to say that the authoritative treatise on the anatomy of the teeth by Dr. Black and Dr. Brownell leaves no excuse on the part of manufacturers for furnishing us with such sorry imitations of the natural crown as we are obliged to use. I might also dwell on the fact that by far the largest percentage of indications for Richmond crowns are in the mouths of patients past middle life; and yet the facings furnished have the appearance of the teeth of youth. They show no signs of age, no marks of wear. I know well, however, that abrasion, erosion, and even atrophied enamel formations may be imitated by grinding and by the use of high fusing colors. I believe that we have a right to demand that the manufacturer furnish us with teeth which show all of the peculiarities of age. But it is not these things which I wish to emphasize in this paper; I wish to discuss the color of the teeth.

In the American-made teeth furnished us, the pigment, in a large proportion of the facings, is not properly distributed; it is put on the lingual side of the facing, and extends only over the gingival third. It follows that should we succeed in getting a facing somewhere near the size and color desired, the grinding of the gingival bevel which would be necessary in order to have the facing approximate the labial bevel of the band, would mean the loss of color. Even if this were not the case, the color would still be defective in extent, since the color in the natural tooth, while gradually decreasing in saturation, extends in most cases

to the incisal third. This is especially true of cuspids. Furthermore, while the natural teeth in the same mouth will be of the same hue, there will usually be found a marked variation in tint, shade, or saturation. The cuspids have the greatest saturation and the laterals the least. These facts must be familiar to every dentist who has the least clinical experience; yet the manufacturer seems to have overlooked them entirely.

In order to get at the problem before us it is necessary to inquire first of all into the probable source of the color in the teeth. It is my belief that the tooth-crown receives its color mainly from the dentin, although the pulp may be a contributing factor. About 25 per cent. of the dentin is made up of organic matter. After the death of the pulp the organic portion of the dentin disintegrates, causing the tooth to become darker, and in some cases, radically changing the hue. In old age, when the pulp recedes, the hue appears to become more saturated, resulting, in some cases, in a decided orange. Since, in my opinion, it is the organic matter of the dentin which is mainly responsible for the color of the teeth, owing to the small amount of organic matter contained in the enamel, the color contributed by the enamel is probably negligible.¹ Indeed, American histologists are practically unanimous in agreeing on the absence of organic matter in the enamel. European histologists believe, however, that the enamel contains a slight amount of organic matter; but even they do not claim over 5 per cent. The amount of pigment contained in so small a percentage of organic matter would be hardly appreciable. Normal enamel, then, can be expected to contribute only white or brightness value to the color of the teeth. Very frequently, however, where the labial and lingual plates of enamel come together for a short distance on the incisal (most frequently seen in the lateral), the dark oval cavity is reflected through, and gives a grayish, and in some cases what appears to be a bluish, hue to the incisal. We have all experienced disappointment, I think, in trying to match this so-called blue tint in the incisal region. It is possible to obtain

¹It is true that brown streaks are sometimes seen in the enamel, known as the brown striae (stri-ah) of Retzen's; but these are regarded by Tomes as being due to nutritive disturbances during the developmental period, and may, therefore, be left out of account. Retzen.

Tomes' *Manual of Dental Anatomy*, Chap. 3, page 58, 1890.

facings with a very washed-out blue tint at the incisal edge but they do not look natural when placed in the mouth.

Suppose, now, that we consider the enamel by itself. What is its color? We all have a more or less hazy notion, I think, but no exact symbol or symbols by means of which to express it. We usually call it gray. Do you mean by that what psychologists mean, namely, a mixture of black and white? The inexactness of our symbols of expression will be realized when I recall to your minds that although we are able to distinguish some 700 different brightness qualities between the deepest black and the most brilliant white, we have only about four symbols in common use by means of which to express them all: black, white, light gray, and dark gray. I have come to the conclusion, through my own experience and by questioning a number of my fellow-practitioners, that the enamel of the teeth may well be compared to a white pearl. This comparison may be best appreciated by examining the rounded cusps of a freshly extracted bicuspid or molar. And indeed, to refer to the youthful denture as a row of pearls is not inappropriate. The teeth of people of mature years, however, never receive such poetic comparison, for the enamel becomes stained with age. In this sense alone can the enamel be said to contribute to the color of the teeth.

If we make a casual examination of the stock of teeth at the dental depot, we would be inclined to say that the hues, tints, and shades of the solar spectrum were fairly well represented. Yet to the initiated the imperfection of the display is altogether too evident. And who of us has not repeatedly been disappointed in trying to match the human teeth? We are all more or less convinced, I am sure, of a serious defect somewhere. When we stop to think, however, our sense of justice, as I have said before, tells us that the blame does not rest alone on the dental manufacturers, for we ourselves do not, in most cases, know what we are really looking for. Even those favored persons who can carry the hue in their memories, or in their eyes, as we commonly say, rarely have any symbol which will exactly express its position in the solar series. Our terminology is lamentably deficient. Perhaps we call the illusive hue yellow. It is then fair to ask whether a color as pure yellow is to be found in the

teeth of the Caucasians? It is generally true that the color of the teeth of the type called brunette will be found to be more saturated than in a blonde, and the pigment will be found to vary in proportion. For nature, here as elsewhere, tends to maintain an equilibrium, or harmony, in the body pigments. In the eyes, hair, skin and teeth there is usually a harmony of color. For example, if we should analyze the feelings we experience on first seeing a woman with her hair dyed red, the word *discord* would best express them, for the skin and hair would not be in harmony; and therefore the effect is quite the opposite from the one intended. A want of harmony between the hue, tint and shade of the teeth and skin is equally unpleasant, and yet I think it is an uncommon experience to see a porcelain crown that we cannot instantly detect, and which, if we were to pass judgment, we would pronounce off-color. In other words, we are conscious of the discord. My conclusion at this point is, therefore, that the first prerequisite for understanding the color of the teeth is to classify the types of human beings accurately, and name the color of teeth each type possesses.

If we had only distinct types to deal with, however, such as blondes and brunettes, the task of standardizing the color of the teeth might be comparatively easy. But by far the largest percentage of human beings are of that indefinite type which we class as brown-haired. Members of this class may have either blue or brown eyes, either light-brown hair or dark chestnut. Now, brown is a mixture of yellow and black; therefore it would not be accurate to symbolize this large group, the individuals of which are neither blonde or brunette, as *brown*. Here we have another problem in terminology.

Enough has been said to show that we cannot get very far without accurate classification and symbols. We need the symbols to express our thoughts. Such a classification would not only result in more artistic production by the profession, and thus be a source of increased pleasure and pride in our chosen calling, and a great economy of time, but it would enable us to speak with authority; to agree on what we want. And the manufacturer could not lag far behind us.

It is not enough, however, to have the types of human beings

accurately classified with a symbol designating the color of each; a knowledge of the fundamental laws which govern the phenomenon of color is a prerequisite to such as investigation. This appears on the face of it to be a formidable matter. A brief sketch, in which I hope to show their practical application to the subject under discussion, will convince you, however, that the difficulties in the way of the standardization of the color of the human teeth are more apparent than real. First: Let me repeat that the hues to be found in the different types before mentioned, need to be standardized. I have come to the conclusion that the hues to be found in the Caucasian race lie somewhere between orange and red, and orange and yellow, in the spectral series, with the addition of white and black values; and that all the other colors are due to the effect of what are known as the phenomena of simultaneous contrast, successive contrast and negative after images. Second, we must adopt symbols or words which will express exactly the hue, tint, or shade indicated, and the degree of saturation; for pure tones are never to be seen in the teeth. In other words, we must have a systematized nomenclature of all the colors to be found in the human teeth.

The reason why we have no terminology for the colors to be found in the teeth, as well as in many other things, is due to deficient sensitivity and education. Yet natural history abounds in proofs that color discrimination is innate not only in man, but even in animals. Darwin² devotes several chapters to color discrimination among animals, and shows color to have a definite purpose and to be useful either as a means of protection or concealment from enemies, or as a means of recognition by their own kind. Colored fruits form by choice a considerable part of the food of monkeys in the tropical regions of the earth.

If monkeys can distinguish colors, then surely it may be inferred that so could the most primitive men. Tests on primitive people for the purpose of determining the sense-acuteness, have brought out the fact that their power of discriminating color was about equal to that of children in the first grade or in the kindergarten. In addition, the color vocabularies collected from different regions showed instances in which a single word was made

² Darwin, *Descent of Man*, 2d ed., pp. 108, 279, 332, 335, 469.

to do duty for two or more color-sensations; that is, black and blue, for blue and green. All peoples, however, have a definite symbol for red. Such confused nomenclature naturally implies corresponding limitations in the degrees of sensory color-discrimination. And there are unquestionably other factors at work in determining the differentiation of the names for sensations. In the first place, it is quite conceivable that a sensation may not be of sufficient value or interest to receive a special name, although it is capable of being fully experienced and discriminated. Were we, for example, to ask of a civilized community what object they would describe by the word *gray*, surprising, indeed, would be the variety and incongruousness of their replies. Yet such confusion would not be inevitably the expression of deficient sensitivity. People could easily learn, under stimulus, the exact difference in meaning between gray and buff. The conclusion is that certain instances of confused terminology may be due simply to insufficient pains having been taken to analyze sensory experiences.

This conclusion is further borne out by a color test given at my request in the Irving Kindergarten School of St. Paul. The test was with Holmgren's wools. It was found that those children who had learned the names of the different colors could sort them, but those who did not know the names confused red with pink, and blue with violet. Faintly colored wools tended generally to be confused with one another.

From all this, I think we may safely and reasonably conclude that color-discrimination is innate; and second, that the power of discrimination among the finer shades and tints is only a matter of education. This second point has an important bearing, as you can readily see, on crown and bridge work considered from the view-point of an art.

But already in discussing a few of the factors that in my opinion, should be included in a treatise, even of the most elementary kind, dealing with the artistic side of the matter under discussion, I have used what might be called technical terms of a nature, which some will protest, no dentist can be expected to know or understand. Such a protest, of course, is a naïve confession of ignorance, because a knowledge of the vocabulary of

color is a prerequisite to even an elementary study of nature. It points further to a serious lack in our educational curriculum. A scientist should certainly know the terminology of his science and related sciences. For the replacing of natural teeth with artificial substitutes is the one science and art which we cannot help practising; and if we cannot practise it well, we must continue to practise it poorly. In order, therefore, to make my points more intelligible, perhaps, I shall include at this point what must necessarily be a very sketchy and superficial review of the science of chromatics, and this merely for the purpose of making my nomenclature clearer.

Light—I refer to solar light—is the physical cause of our sensation of light. Webster³ defines light thus: "Light is that agent, force, or action in nature by the operation of which upon the organs of sight, objects are rendered visible, or luminous." Without going into the various theories of light, let it suffice to say that it is composed of an indeterminate number of variously-colored rays. The sensation of color depends upon a peculiar function of the retina, or optic nerve, in consequence of which rays of light produce different effects according to the length of their waves or undulations, waves of a certain length producing the sensation of red, shorter ones green, and those still shorter blue, and so on. The color of objects depends upon their power to absorb or reflect a greater or less proportion of the rays which fall upon them. In other words, the natural color of objects results from the fact that one portion of the colored rays contained in white light is absorbed at the surface of the body, while the other portion is thrown back. It is the ray which is thrown back that gives the color to the object. For example, if the light which falls on an object is completely absorbed by that object, so that it disappears from sight as if falling into a perfectly dark cavity, the object appears to us black. On the other hand, if all the light is reflected from the surface, the object appears white. The rays may also be modified by the character of the surface.

You can readily see how this affects our science. If the object is polished, as are the surfaces of the artificial teeth furnished us by the manufacturers, the rays are pressed together,

³ Webster, Noah, *International Dictionary*.

as it were. They are then thrown back as a solid beam. If, however, the surface of the object is irregular, as is, for example, the enamelled surface of the natural teeth (I refer to the imbrication lines of Pickerell),⁴ the rays are dispersed in every direction. While the unabsorbed rays may be the same as those thrown from a polished surface, yet we are immediately conscious of a difference in color. This has an important bearing on the color of the teeth. It is at once apparent that to obtain a perfect match in artificial teeth, we must have not only the same color, but also the same kind of surface. I have no doubt, however, that since both Pickerell and Williams⁵ have called attention to this subject in their exhaustive monographs published recently, the tooth manufacturers will soon accept the suggestion.

Another matter that must be taken into consideration is the checks and cracks to be found in the enamel of the teeth as people grow older, especially in those of people past middle life. In the same way that the grooved surfaces of the enamel affect the hue of the teeth, so these checks and cracks must be counted as a modifying factor when matching artificial and natural teeth.

Since the color of the teeth is affected by so many factors, it will perhaps be wise to go more deeply into the definition of color. The psychologist recognizes three aspects of color: hue, degree of saturation, or purity; and illumination, or brightness. When a ray of sunlight is admitted through a small aperture in the window-shutter of a dark chamber, what is seen is a round and colorless image. If, however, a glass prism is interposed in its path, the beam on emerging from the prism becomes refracted towards its base, producing on a distant screen a vertical, rounded band no longer white, but showing all of the hues of the rainbow. This is called the solar spectrum. What has happened is this: the white ray has been broken up into its elemental hues,—red, orange, yellow, green, blue, violet. It is interesting to note at this point that here is the only place in nature where we get pure hues. The hues of the landscape, for example, are always modified by a mixture of white or gray light.

But to return to the matter in hand. Now if we should dis-

⁴ Pickerell, *Prevention of Dental Caries*, Chap. IV, pp. 62, 67, 69, 73.

⁵ Williams, *New Classification of Natural and Artificial Teeth*.

cover that the hues in the human teeth could be placed in the orange part of the spectrum, we would have an important starting-point. In order, however, to match the exact tint or shade of orange, it would be necessary to determine not only the hue, but the degree of saturation or purity. This can be best illustrated by charts,⁶ the first one showing the highest degree of saturation possible to obtain. The next chart is slightly less saturated, and so on through fifty charts. The last chart shows only a faint trace of the orange hue. The point to be noticed here is that the hue is the same. No other hue has been added because of the lower degree of saturation, for white is not properly a hue. It is not correct, however, to call the diluted orange tint, yellow. Yet this is the mistake made by the average person. A course in color-discrimination would not come amiss in order to avoid such common errors. The mistake of calling orange yellow has been made, I believe, by Dr. Clapp;⁷ for the charts attributed to him and published in J. Leon Williams' book on *A New Classification of Tooth Forms* shows the gingival third of the tooth as orange, in which there is a slight overlapping of yellow; the middle third is called yellow; and the incisal third, gray. While I believe that Dr. Clapp has distributed the hue about as it is found in nature, yet the pigment in the dentin will be represented, it must be emphasized, by *one* hue with a more or less degree of saturation.

Another interesting element enters into the situation. Those of us who have offices which admit the direct sunlight during certain hours of the day will appreciate the effect of illumination or brightness in changing the hue of the teeth. The red end of the spectrum when highly illuminated gradually changes to orange. If the brightness is increased, it appears yellow; and if still further increased, it looks white. The blue end of the spectrum, on the other hand, becomes gray under increased illumination. Conversely, if the spectrum is darkened, the red end looks brown or black, and the blue end looks black. This can be readily tested by walking at twilight in a garden filled with variously-colored flowers. As darkness gathers, the colors

⁶ Charts used as illustrations.

⁷ Page 67, Dr. Clapp's Chapter on Color.

gradually disappear, even though the shapes of the flowers may be distinctly seen. The photograph illustrates the same thing. The hue here is left out, only degrees of brightness being noted. In matching the teeth, therefore, the kind and amount of illumination under which they are seen has to be considered. Let me explain this matter more in detail. The natural teeth, because of their position in the mouth, surrounded as they are, by the shadow of the lips, and back of them the more or less dark, oral cavity, will be under a very different illumination from the artificial tooth held in the hand or tweezers, or in front of the patient. In order to be sure that the artificial tooth will match in color the natural teeth, it is best to defer the selection of the tooth until the tooth to be crowned is ground off sufficiently to allow the facing to be placed in the exact position it is to occupy permanently.

Now, we must take into account one other thing in order to match our teeth successfully. If we look for some time at a red, and then look at a colorless wall or a piece of paper, we find that a greenish tinge is given to the colorless wall or paper. Similarly, if we do the same thing with a greenish object, we find it to be followed by a reddish tinge. Again, if we look for a time upon a yellow object, and then focus on a colorless ground, the latter takes on a bluish tinge. Similarly, the blue is followed by a yellowish tinge. This is the phenomenon of *negative after-images*. Again, if I place a yellow and a blue alongside of each other, the yellow will appear "yellower," (i.e., more saturated) and the blue will appear "more" blue, at the line of junction. If I place a green alongside of a red, the green and red will each appear more saturated at the line of junction. This is called *simultaneous contrast*. Again, if I look from a yellow to a blue object, the latter will appear "more" blue, i.e., more highly saturated, than before. The same holds of the relationship of red and green. This is called *successive contrast*.

These things must be taken into account and guarded against if we would make successful matches of color. A bright object appears brighter when put alongside of a darker one, and vice versa. And just as the object that is placed alongside of the red takes on a greenish tinge, so the human teeth appear

greenish when seen surrounded by the healthy red tissues of mouth and lips. Thus teeth that in themselves are of a decidedly orange hue, will often appear greenish yellow, as a result of their being surrounded by very red tissues. In short, the factor of negative after-images and simultaneous and successive contrast tend to make the teeth appear of a different hue and a different brightness when inside and when outside the mouth.

As I stated at the beginning of my paper, it has not been my intention to formulate here a course of study which will give us the right to consider crown and bridge work among the fine arts. I have merely endeavored to indicate a few factors which enter into securing artificial teeth that shall be a real imitation of nature. The requisites of prime importance for the individual dentist are: to be fully informed on color; to train his powers of color-discrimination, and thoroughly to understand all of the elements which enter into a modification of the color of the teeth.

BIBLIOGRAPHY

- Chevreul, M. E., *Chevreul on Colors*, English edition, 1868.
Abney, Captain, *Color Measurement and Mixture*, English publication, 1891.
Myers, Charles, *Experimental Psychology*, 1912, Cambridge University Press.
Rood, Ogden N., *Text Book of Color*, 1881.
Ganot's *Elements de Physique*, 1890.
Allen, Grant, *The Colour Sense*, English publication, 1879.
Mind, N. S., *Some New Observations in Support of Thomas Young's Theory of Light and Color Vision*, 1901, 452, 510, 374.
Rives, W. H. R., *Primitive Colour Vision*, Popular Science Monthly Lit. 44-58.

ANNUAL ADDRESS OF THE PRESIDENT¹**MASSACHUSETTS DENTAL SOCIETY**

In reviewing the history of the Massachusetts Dental Society during the past year, two views may be taken; one, external and embodied in acts and events, the work of committees and other outward signs of activity; the other, more internal and general, emphasizing the scope of the organization, possibilities for service, and trends of thought and judgment. And yet these two aspects are so closely related, the mutual action of external and internal, of body and soul, is so constant and so vital, that neither can be considered radically or at length without reference to the other, nor should they be so considered. And more broadly, the society in its relations and activities is but one of many organizations and movements, making for the well-being of society and the State, and the feeling of mutual relationship and responsibility is constantly deepening. It must not be forgotten, however, that over against this hopeful condition there is apparent everywhere the insistence and over-insistence on the rights of the individual as against the rights of all, and an indifference to social needs and social welfare; and if this annual address may be considered as having a theme apart from a review of the past year and a discussion of the status of the society, it must be found in the thought of closer relations with organizations and individuals working for better social conditions, and a more definite devotion of special gifts and powers to the good of all.

Turning to some of the special features of the life of the society during the year past, the first, perhaps, in the order of time, though not in prominence, is the school dispensary bill, which was signed by the Governor last June. This bill had its rise in the dispensary committee; it was placed in charge of a school superintendent, and was supported by the Massachusetts Civic League. Strong outside indorsement was secured for it. It was amended in the House, and in the opinion of its supporters made less efficacious, but the main principles involved were not affected. Its passage renders needless the introduction of special bills for dispensaries, commits the State to the prin-

¹ Read before the Massachusetts Dental Society, Boston, May 5, 1915.

ciple of specific help for needy children, clears away certain doubts regarding the appropriation of public funds, and is a help in the starting of new movements in this direction; but it is liable to become a dead letter if the friends of the work are not alive to the need of strongly supporting and augmenting those dispensaries already started, of moving for new dispensaries where needed and continuing the campaign of education with the public, often inclined to consider such questions as this but passing fads, and to grow weary in the task of furthering the claims of its feebler and more needy members. It is probable that no better service apart from office duties could be rendered during the coming year by many dentists of the State than by working in the interest of the school dispensary. While the dispensary is not in a critical condition, it unquestionably needs strong support at this time when other questions looking to the well-being of the child are demanding to be heard, and the tax paying public has not come fully to understand the present cost and the future economy of efficient school management.

The school dental dispensary suggests the Forsyth Dental Infirmary for Children, which was dedicated with fitting exercises a few months ago. Though there is no direct connection between the Forsyth Infirmary and the Massachusetts Dental Society, the indirect and sympathetic relations are many, and the great success of this institution, which it is easy to predict, will be likely to strengthen the work of the society in numerous ways. "Shoulder to shoulder" is more and more the watchword in all movements making for social betterment. This is not the time nor the place to suggest what helps in dental education, what training of workers, what improved systems of work, what model methods in the care of children, and what inspirations may proceed from this institution, but only the mention of its name inclines one to be an optimist.

The committee on dental education, joining with the corresponding committee of the Metropolitan District Dental Society, provided during the winter a full and varied course of lectures at the Tufts College Dental School. The course was attended by a class of over forty paying members. The timeliness of this course becomes apparent when one considers the very

general feeling in the profession that dental education, to meet new relations and conditions, must be more complete, and, responding to this, that the dental schools are considering a fourth year. One of the papers to be read at this annual meeting will present this question in one of its aspects. Everywhere the pressure for better equipped professional servants of the people seems rife except in some contemporary legislation involving educational requirements where the poor boy would seem to be quite as great a favorite as the poor public. It is, perhaps, superfluous to add that enlarging the curriculum of the dental schools would not render less imperative, but more so, the need of providing some means for meeting the demand for additional lectures and demonstrations from dentists in active practice.

Somewhere in dental education there should be provision for more definite training in the significance of professional service, in the relation of the dentist to his patients, the conduct of his office practice and his activity outside his office in the community where he is located. These questions and others equally important have not been entirely overlooked, but they have not been steadily emphasized. Some of them are vital to the higher conceptions of the profession and they have often been treated as incidental. Professional service is not primarily for the advantage of the dentist, but the public, some of our legislators to the contrary, notwithstanding. No one for a moment questions the fitness of sufficient remuneration for every capable and honest worker, but neither the profession at its best nor the public would tolerate the mercenary attitude. To hold this position and advocate it without over-emphasis and insincerity is not always easy but it can be done and it must be done.

To turn from dental education to dental legislation involves no sudden transition of thought, for the questions are more than mildly related. Last winter the committee on dental legislation, working with the committee of the allied societies, prepared a bill and brought it before the legislature. It is still under consideration. This bill provides for a re-statement of the dental law now on the statute books, and contributes several additional sections relative to educational requirements for candidates about to take examination before the State Board, dental hygienists in

public institutions and other pertinent questions, which, taken together, would place Massachusetts fairly abreast of most of the other states in dental legislation. The bill certainly is not radical or experimental; it should rather be considered conservative. Several years' experience of the committee on legislation has made it possible to prepare, both in form and substance, a nearer approach to an ideal bill than was embodied in any one of its several predecessors, and the attempt deserves success.

The by-products of this struggle for better dental laws have seldom been mentioned, but they are not unimportant. They illustrate how the processes of advancement are often unrecognized and the forces which are to marshal for ultimate victory are recruited in secret. To discuss year after year the questions which dental legislation involves, some of them among the most vital the profession has to consider, to meet opposition, to struggle for the maintenance of tolerance and good feeling, to catch glimpses of a wider outlook and feel a passing thrill of deeper experience as one comes in contact with men and women of other professions and callings, and certainly, not the least, to smart under defeat and rise above it—really, these are opportunities no one had counted on, or but partially, and among professional experiences few are more valuable. To work without vision for the continuance of things as they are, when there is the guiding "light that never was on sea or land," and everywhere men and women who dare to cope with evils which society has never so seriously attacked before, will doubtless yield its reward, but it can hardly be the reward of boundless hope for the future.

The support which the Massachusetts Dental Society has given for a long period to THE JOURNAL OF THE ALLIED DENTAL SOCIETIES should be continued with heartiness. THE JOURNAL, now published as a quarterly, after nearly ten years of steady progress, has established itself as one of the ablest, most attractive and best regarded of dental publications. Its friends and especially its managing board, though never doubting that the position of the independent journal is the right one, the one in line with present day standards, are far from feeling that they hold any special brief in the interest of virtue. They have no contention with the journals published by the business houses; on

the contrary, their attitude is appreciative and friendly. Our present concern is only with the principles and quality of THE JOURNAL, which, it is a satisfaction to declare, have secured the undoubted loyalty and evoked the high commendation of the members of this Society.

The question of loyalty, suggested by reference to THE JOURNAL, has its relation to the life of such an organization as the Massachusetts Dental Society and your President will make no apology for briefly considering it at this time. Loyalty to an idea or an organization is an undoubted reality, but its rise is often as mysterious as it is beautiful and vital. We have it, but we shrink from saying that we are the authors of it. Is it, or the favorable soil for it, born in us? Does it come in part from early education? Do we feel the thrill of it when we come in contact with other men who possess it, or when we are enthralled by the noblest literature which is full of it? Is it caught from the spirit of our time? Doubtful we may be regarding its sources, or some of them, but we know that it is ours; and it is a great quality, into whose perfection love enters, an appreciation of the highest and best, sincerity of purpose, constancy and unselfishness. When we exercise it on some object or devote our best powers to the advancement of the cause which is our ideal, loyalty grows and not seldom the ideal and the cause are purified. Few are the organizations in which we are interested, unworthy of our support. The State Society is certainly worthy, and in thinking over all that it means in its varied activities, not omitting its inspirations and its opportunities for fellowship, one is inclined not so much to bespeak loyalty as prophesy it, or better, wonder that every member is not loyal.

About sixty new members have entered the Society during the past year and there has been a net gain of about thirty. Your President appreciates the effort of those who have contributed to this gain. Criticisms are frequently heard that the Society contains, with its seven hundred and thirty-eight active members, less than a third of the practising dentists of the State. Many difficulties seem to prevent a full enrollment. Some of these can be overcome. With the present organization of the Society into constituent bodies, which is probably as good a scheme as any

which could be devised, hundreds of dentists are but indifferently accommodated for attending the local meetings. In the Central District, for example, out of its sixty-four members, only four are located outside of Worcester. The region with Fitchburg for a center and other sections of the district are practically isolated. There is and has been for some time a problem in the north-eastern portion of the State, especially in the Lowell-Lawrence district, where last spring a society for mutual improvement was formed, numbering over one hundred. But allowing for all the various obstacles, including the chief one of chronic indifference, it is without doubt true that with reasonable effort two hundred and fifty members might be added before the close of another year, bringing the enrolment up to a full thousand.

Your President does not feel that he has any special word to add in closing this address. The past year has been much like other years, and if the past Presidents are to be trusted, the former years have all been good ones. Few recommendations have been made, partly for the reason that the business meetings have always appeared to be crowded with important matters from other sources and partly because it seems to your President that the machinery of the Society needs rather to be used than repaired. The work of the Society is done largely in committees and these committees are usually well able to handle their problems. Your President will remember with unusual pleasure the hospitality of the District Societies, whose life seemed to him to exemplify the motto on the seal of the parent organization: "Sani in ratione in usu periti."

HENRY H. PIPER.

INTERRELATIONS BETWEEN DENTAL AND MEDICAL PROFESSIONS¹

BY CHARLES F. PAINTER, M.D., BOSTON, MASS.

According to the suggestion of your presiding officer, I shall speak on some phases of the interrelation between the dental and the medical professions. These interrelations are becoming more and more intimate every year, in part because of a growing recognition on the behalf of your profession of the dependence of many of the problems with which you have to deal upon general systemic conditions, and in part upon the appreciation by the medical profession of the fact that they need in many cases your advice and assistance in solving some of the difficulties that present themselves in their own practice.

One of the chief fruits of the tendency toward specialization, so manifest in the past twenty years, has been the investigation of problems leading to the establishment of a more exact knowledge in many subjects, or an approximation thereto, which could not have been brought about had not men set themselves aside, so to speak, to study these matters. There has been much put forth as finality which is not true, but there have been perfected and brought into usable form, for the rank and file of both professions, much that has been of benefit to the public whom we, in common, serve. Just now, or in the past five years, it may be that specialization has become a little too rampant. Indeed, I believe I see signs of a tendency to recede from too ultra a position in this regard in recognition of the fact that the public have some rights in the matter that it would be well to respect. Patients cannot be expected to bear the financial cost of great refinement in specialization, raised to the Nth degree, neither is that sort of thing good for the practitioners of a profession. Perspective is lost, and one sees only a very small segment of the entire field. The ideal state will be reached when men are so well selected for their profession in consequence of natural gifts, and that sort of liberalized training which enables them not only

¹Read before the annual meeting of Mass. Dental Society, Boston, May 5, 1915.

to observe accurately and acutely in their chosen calling, but more especially impels them to weigh evidence scientifically, and because of their perspective to draw more logical deductions from the observed facts. I believe there is no valid reason for the existence of any of the so-called specialties in the broad domain of medicine, other than that which is the result of especial deftness in the particular manual manipulations which characterize practice in a restricted anatomic field. Some men find it easier to develop technique in one line than in another, but technique is not the prime qualification for practice in any department. Surgical diseases should require no less acumen than those classed as medical. Surgical technique has been perfected to so high a point of refinement, however, that many so-called surgeons prefer to rely upon their ability successfully to practice their technique upon a condition that is popularly regarded as being surgical rather than more laboriously and less brilliantly treat the patient and study the condition. The public at large are very tolerant of the efforts of specialists to bring relief to their troubles through their lack of appreciation of the fundamentally narrow point of view of many who are setting themselves up as specialists.

There are many monuments to the insufficiency of the methods employed by practitioners in special fields which might be cited by one conversant with the results. For example, there was a time, not long since, when malpositions of the pelvic organs in women were thought to account for all manner of troubles, and the gynæcologists assiduously devoted themselves to the relief of these troubles through operative correction of anatomic disarrangements. When I was a medical student phimosis in infants was thought to be a cause for the inguinal hernia occurring not infrequently in children of tender years. Because of this supposition circumcision was frequently performed not only to cure hernia, but to prevent it. Eye strain from one cause or another shared with pelvic disarrangements an important role in the causation of various nervous disorders, and to-day visceral ptosis is occupying the center of the stage as a prolific cause for many of the ailments of the flesh.

Were I sufficiently familiar with practice in your special

line of work I have no doubt that I could cite instances comparable to those I have alluded to where dental caries, perhaps anomalies in the development of the jaw or eruptions of the teeth, certainly as regards the effects of pyorrhea, has been claimed with equal justice to be the ultimate cause of many incongruously related disturbances either local or general.

The fact that sensible men, trained to the practice of what are regarded as the learned professions, can so lose their balance as to allow themselves to be led far afield, as they undoubtedly are very many times, is evidence, I think, that specialization has its faults, and that not the least of these is the error of forgetting that there may be many causes for the same phenomena, and that one must be capable of seeing things from many angles before one is competent to pass on the value of symptoms which may offhand seem to classify a given condition.

The development of specialization has led to investigation along very narrow lines, even within the specialties. There are wheels within wheels. In internal medicine and surgery it is the same. In your own profession practice is tending in the same direction. You commenced by relegating extracting to those who had a special facility in that line of work, more I am constrained to believe for reasons other than lack of ability to acquire the technique than because of the difficulties of the operation. Now, there are about as many subdivisions of the work of your profession in practice as there are in the medical profession. As there are dangers that a man who specializes in the broadest sense will lose some perspective when he comes to look at a case from the broadest viewpoint that he can examine it from, so there is infinitely more danger that the subdivided specialist will see things from an even more restricted vantage point. These sub-classes of specialists have made their place as a rule, in view of some particular research which they have carried out, as, for example, a bacteriological investigation of the flora and fauna of a particular region, or perhaps the influence of a particular drug or animal extract upon blood pressure. There may be no reason for supposing that blood pressure fluctuations have anything to do with the condition under consideration, but it is not difficult to establish yourself as an author-

ity on that matter, and justify yourself in crediting yourself in your own estimation and that of your following, with knowledge of a very special character.

There is a great enthusiasm for research in these days. One must do something of this sort to show that he is alive; he must write papers to read before scientific societies. Nominations to positions in the staffs of hospitals are in some places made contingent upon the doing of these things; very often promotion is made so contingent. Professional schools encourage it even among the undergraduate students. Every one must produce something, it does not much matter what it is. There is always some place it can be published, and once that is done one's scientific status is determined. The result is that there is an enormous amount of so-called scientific research going on that is useless in itself, and that does more harm than that which results from merely wasting an individual's time. The desire to "do" research is contagious, especially when it is fostered by schools, scientific associations, hospital staffs, etc. I doubt if there is more than one man in a hundred, if there is even that number, who is mentally qualified to become a research scholar.

In consequence of the activity of these research workers, there has been, in medicine at least, a growing tendency to rely upon laboratory methods for diagnosis, and also for treatment to a considerable extent. Clinical methods have been given the "go-bye," and relatively students are not as well trained in the old-fashioned methods of investigation as they used to be. We are taking up with new things only to discard them in a short while for something else, never, or scarcely ever, pausing to take account of stock to see whether the method being discarded was a failure, whether it was better or worse than that which preceded it, or whether the change is made for the reason that the variations in feminine attire are made from season to season—viz., in order to exploit the promoters of the new fashion and satisfy the desires of the public for a change.

It is farthest from my wish to say anything to disparage scientific study, or to imply that no progress has resulted from all this. I believe that immense good has already come from it. In many respects medical practice is better than it was before

specialization became developed to its present extent, but dangers are always likely to be associated with any movement, no matter how good it is. It is desirable from time to time to consider what represents real and permanent additions to our stock of knowledge, what methods are producing results that are conceded to be worth while, and what harmful effects, if any, are there that may tend to diminish the value of the good work or vitiate the methods employed to secure what has been substantial in the advancement of the profession we are interested in.

I believe that the most serious obstacle to the attainment of the rational practice of the profession of dentistry is the failure to insist upon such educational qualifications for entrance upon the study of the profession as will insure the right sort of men—men with the possibility of the attainment of not merely a high degree of technical facility, but a broad conception of the relations of pathological processes in the mouth to systemic conditions, and high ideals of the relation of their professional abilities and proficiency, to the public at large in all possible associations into which they may be brought with it.

The broader the groundwork of general education which the dental student has, the more likely he will be to attain to the best in his professional career. Without this he will lack a very essential factor, if indeed it is not the most essential one, for discriminating between that which is of real and permanent value in the work that is being done to advance the technical and theoretical sides of his professional work, from that which is spurious and evanescent. If he is inclined to, and happens to possess the qualifications for, research, the broader his educational foundation the more reasonable will be his selection of lines along which to direct his efforts. Furthermore, with such a groundwork to build upon his perspective will tend to make him a more reasonably conservative or a more cautiously radical practitioner of his profession, in accordance with his mental make up. In other words, he will be a more rational operator.

As the dental specialty develops less along the purely mechanical lines and progressive dentists branch out into a broader field, including oral surgery, prophylactic hygiene, orthodontia, etc., the need for better trained men becomes more and more

apparent. Such men demand greater educational advantages, and feel the need of a wider experience in the interpretation of the clinical phenomena of disease. They should, I believe, have opportunities for clinical study, and the curriculum of the dental schools should provide it in certain special fields at any rate. There is more and more need for better grounding in the sciences fundamental both to the theory and the practice of dentistry, the ground work to which should be laid before entering the professional school and continued through the first year at least.

I presume it will be a long time before it can be brought about, but I believe the best results would come from the inauguration of one or the other of these two plans. First, make the would-be candidate for a degree in dentistry spend six years in securing it, in combination with a medical degree. The University Dental and Medical Schools could easily, I am sure, through consultation with each other, arrange a combination of medical and dental subjects and their fundamental sciences that would provide a course leading to the combined degrees, which would be academically satisfactory and fulfill all the desires of those who wish to practise dentistry in the broadest possible manner. Secondly, to follow out the plan now being inaugurated in the preparation for certain of the specialties of medicine, notably the eye, ear, nose and throat; and that is, after the degree of medicine has been obtained take a post-graduate course of two or three years, at the completion of which a special degree should be given, indicating the department in which proficiency has been attained. At the University of Minnesota this plan is now in actual operation so far as the eye, ear, nose and throat is concerned. It will be a great relief to the curriculum of the medical school to be able to reduce the number of hours in the third and fourth years now given over to the specialties, for when this practice becomes more widely adopted for these and other specialties, the time heretofore devoted to them may be allotted to medicine and surgery and other fundamentals.

I believe that all dental schools affiliated with colleges and universities, where there is a medical department, could easily do this, and that it would be a great advantage not only to the physician and dentist, but to the public at large.

The product that our schools turn out is likely to be the factor that determines what the public demands of its physicians and its dentists. The better educated is this product the more influence will it have upon questions of vital public interest. The greater the intelligence of the rank and file of the practitioners of dentistry and medicine, the more harmoniously will they work together on the problems that are peculiar to their own profession, as well as those that they have in common. Rivalries and petty jealousies find less place among men whose outlook is wide, and there is no more prolific cause for the defeat of some of the best endeavor in professional life than those very things. A more thorough preparation for the study of a profession, and a liberal education when their study has been commenced, will ensure less of this spirit among practitioners, and therefore make for a realization of higher ideals.

We have in this community extraordinary opportunities for the promotion of the best standards of professional training. With two dental schools which have university or college association, both closely affiliated with well-equipped medical schools, large clinical facilities for both schools, and in the Forsyth Dental Infirmary the possibility of a center for graduate instruction, it would seem that the conditions were right, here in this very community, for attaining the ideals that actuate the most thoughtful of both your profession and mine. Let us all unite to raise our educational standards, put aside our petty differences, if we think we have any, and make of this city a center for dental education and the place from which shall emanate ideas and influences to shape the destinies of the profession everywhere.

MALOCCLUSION AND ITS CORRECTION WITH CROWNS AND BRIDGES

BY J. F. HOVESTADT, D.M.D., BOSTON, MASS.

It is not my intention to treat my topic from the viewpoint of an orthodontist, for I shall deal mostly with cases of advanced age, where regulating is out of the question, and of a few younger cases, where both regulating and crowns and bridges are necessary to get satisfactory results. I will divide these cases into three classes, namely:

1. Normal occlusion.
2. Efficient occlusion.
3. Malocclusion.

The last includes and deals with the lack of contact points, tipped teeth, elongated teeth and closed bite.

Normal Occlusion.

In a case with normal occlusion there is, strictly speaking, no tooth missing. However, when we have a case with one or more teeth missing, where for some reason the adjoining remaining teeth have not "closed up," or "tipped forward or backward," the occlusion of the remaining teeth has, therefore, not been changed (Fig. 1). This is often the case when the patient does not wait too long before having the lost teeth replaced. The bridging of these spaces is a most simple process, so far as restoring the lost teeth to normal occlusion. It is only a question as to the type of the abutments and dummies that are most suitable for strength and beauty.

Efficient Occlusion.

Efficient occlusion is a very convenient term. The occlusion is not normal, but the patient finds it efficient (Fig. 2). Restoration of such to a normal occlusion would involve changes out of proportion to the result, on account of technical and other difficulties.

In this class may be placed some cases of edge to edge bite, or overbite, of the lower molars and bicuspid, and some cases of mandibular or *maxillary* protrusion.

Malocclusion.

Cases of malocclusion are the most common, as almost anything comes under this term. Malocclusion in the adult can



Fig. 1. Normal occlusion.



Fig. 2. Lower bridge, efficient occlusion.

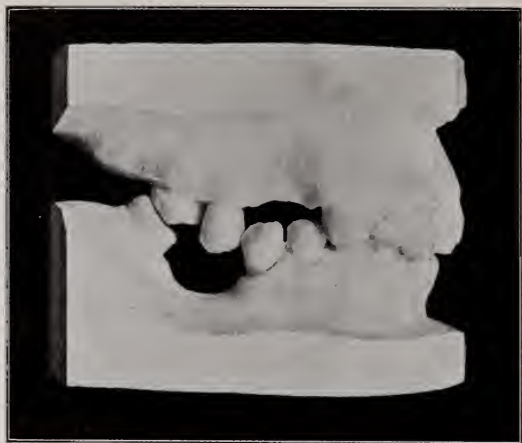


Fig. 3. Elongated teeth. Closed bite.



Fig. 4. Elongated teeth and closed bite.

come from neglect of treatment for orthodontia in childhood, or can be acquired in late life, as "closed bite" (Figs. 3, 4), "abrasion" (Fig. 5), "wear," "protrusion" of the maxillary and mandibular incisors" (Fig. 6—a, b), "tipping of teeth," "elongation of teeth," etc. We will subdivide and consider each separately.

Maxillary and Mandibular Protrusion.

Maxillary protrusion is easily corrected by crowns and bridges, as usually the bite is favorable in such cases, or can be raised.

Mandibular protrusion is more difficult to correct, especially in the adult. For younger patients, the upper incisors may be regulated, pushed forward, or the lower jaw or teeth brought back and the spaces filled in with crowns and bridges. These crowns and bridges will act also as a stay appliance, beside replacing the missing teeth.

It is often desirable not only to adjust occlusion to improve mastication, but, moreover, to restore beauty and harmony of the face. If, after a certain age, orthodontia has ceased to be applicable, cases of protrusion, with or without irregularities of the front teeth, can often be corrected by bridgework in a more radical manner. The irregular teeth can be cut off and porcelain crowns fitted and set at a different angle. Extracting the protruding teeth and replacing new teeth that set in line, by a well-constructed bridge, will often make a better appearance and give a better occlusion.

Wandering Teeth.

With this term, I mean teeth which have been forced out of line either singly or in groups, because of lost teeth or by malocclusion; and it is characteristic that they keep getting worse by moving further and further.

In these cases single crowns are contra-indicated; such crowns have to be connected or the adjoining spaces filled, to hold the new tooth or teeth in place.

In cases of protruding or retruding teeth, single Richmond crowns, or all-porcelain crowns, setting the crowns in line with the other teeth, can be used to restore the normal occlusion. Twisted teeth, their position and appearance may be improved by jacket crowns, stock crowns with porcelain backed on, to get

the desired shape and effect, or hand-carved teeth of any desired shape can be used.

Edge-to-edge Bite.

In most cases of an edge-to-edge bite (Fig. 5), when but a few of the anterior teeth are lost and are to be replaced by crowns or a bridge, it is advisable not to change the bite, by tipping the new crowns or teeth outward, as greater strength of the crowns or the bridge and general harmony of the facial expression is thereby obtained. So often have I seen attempts made to correct an edge-to-edge bite with a bridge, crowns or a plate having the upper incisors overlapping the lower incisors, while the cuspids and bicuspid still remain set in; this giving anything but a satisfactory result. Also, in building a bridge or partial plate to meet the teeth of a narrow upper or lower arch, it is best to be satisfied with a sufficient occlusion rather than to attempt to get the other extreme. Only in cases of the restoration of an entire upper, a lower, or both, would it be advisable to correct an edge-to-edge bite for a patient of advanced age producing a normal occlusion.

The Lack of Contact Points and Their Restoration.

But few men that I have met and talked with on this subject seem to realize what trouble arises from this cause. I am fully convinced that spaces between the teeth, such as caused by the loss of teeth or decay, are more often ignored by dentists than any other form of trouble in the mouth. Teeth have a tendency to move toward the space that occurs from extraction or from decay; and this lack of contact points is the source of great trouble. Bad decay at the neck of the mesial and distal sides of the teeth, also deep pockets, tipping of teeth and other mis-called "pyorrheal conditions," are very often the result of these spaces. I have proven to my own satisfaction that no matter what treatment may be given, a satisfactory result will be obtained only by the restoring of these lost contact points (Fig. 7).

The teeth posterior to an extracted tooth move forward; but the tooth anterior to the space often moves back, on account of force from the occlusion of the antagonist. Small spaces may also occur from atrophied teeth, super-numerous peg-shaped teeth, and from insufficient restoration of fillings. Many dentists

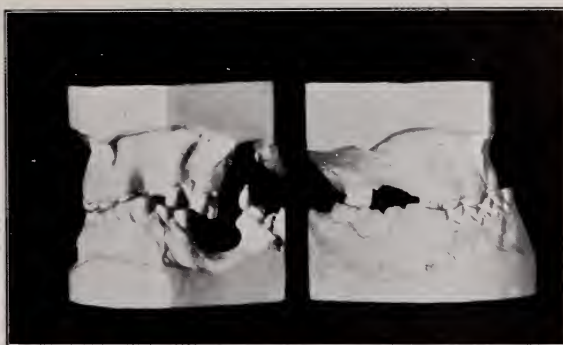


Fig. 5. Case of abrasion.



Fig. 6. (a) Protrusion and retrusion of single teeth.

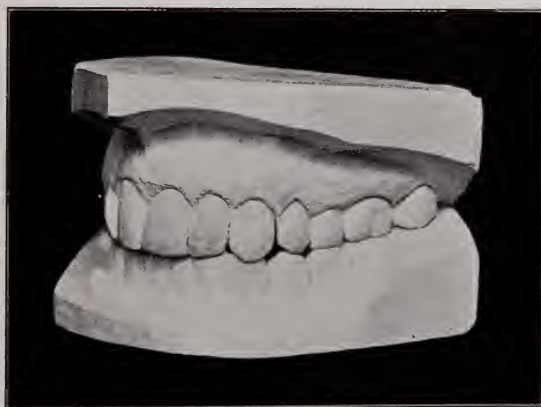


Fig. 6. (b) Corrected.



Fig. 7. Restoration of lost contact points with crowns.



Fig. 8. (a) Lost contact.



Fig. 8. (b) Contact restored.

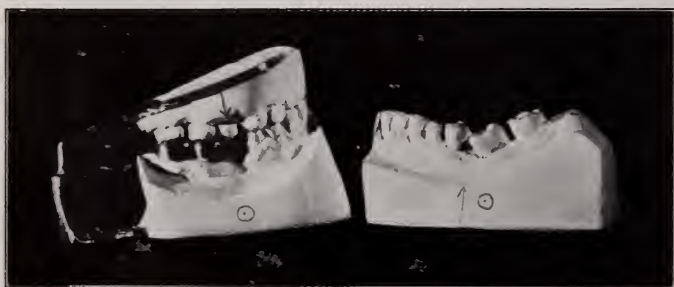


Fig. 9. Tipping of molars and restoration.

in the past were unable properly to contour a foil gold filling, such as was necessary to close the space, and in some cases the patient would not endure this lengthy operation.

Our present methods have greatly simplified this work, and with the aid of the porcelain and gold inlay there is no excuse for not giving our patients what they should have and are willing to pay for. There is no excuse to-day for not building out these contact points with a hard, suitable material (Fig. 8—a, b).

We should remember that the contact points of the teeth are made of *hard enamel*, like the cusps of the teeth. Therefore, let us stop filling and contouring proximal cavities with plain or synthetic cements; it is a waste of time; it surely is not a cure for the tooth. A well-constructed gold or porcelain inlay, or even a good amalgam filling, will not break or waste away. If the dentist feels incompetent, or is too busy at the chair to make such contour fillings, inlays or crowns, he can still learn the new methods of making inlays and crowns. He owes it to himself and to his patients.

Never before have such splendid opportunities to perfect themselves in these new methods been given to the students of the dental schools as well as to the dentists. Our dental journals give splendid articles; also, post-graduate classes are conducted in many of the large cities of the United States, in which some of the best men in our profession give their service, and splendid results are obtained.

Teeth Tipped Forward.

Teeth which have tipped toward a space (Fig. 9), or have been pushed out of vertical direction by force of a faulty bite, complicate bridgework considerably. In some cases, the teeth can be sufficiently ground to bring them in line for a bridge; but in extreme cases it is generally necessary to use special construction, such as:

1. Two-piece bridges with interlocking device.
2. Inlays with posts for abutments.
3. Removable bridges.

Elongated Teeth.

Teeth which do not occlude usually elongate; that is, they grow down from the maxilla or up from the mandible (Figs. 3, 4).

In some cases these teeth have to be restored to normal length, either for looks or to get proper masticating occlusion, when the space opposite is bridged. Such teeth can be crowned or only partly ground down, and can then be finished off, with a well-carved inlay, to replace the occlusal surface and contact points.

Closed Bite.

Closed bite (Figs. 3, 4, 10) may be the result of the loss of teeth or the wearing down of the teeth, or from both. The upper incisors may be worn on the cutting edge or on the palatal surface, or teeth may be pushed out of line by the force of the bite. If abrasion is the cause, the remedy consists in protecting and building up these teeth with so-called gold shoes, inlays or crowns. Missing teeth should be replaced.

When the loss of teeth produces this condition, such a bite may be opened with bridges, inlays, crowns, a plate, or both. I will explain in detail the corrections of such conditions by showing you to-night some slides of practical cases.

Force Used in Mastication.

The force used in mastication is governed greatly by the strength and health of the peridental membrane. This has been proven to my satisfaction by observation in my own mouth, as well as in those of my patients. Experiments made at the Harvard Dental School by Doctor Black and others, leave no doubt in regards to this statement. Doctor Black writes in his splendid work on operative dentistry the following:

“The force of the bite, or the pounds force with which the jaws may be closed upon any object, varies greatly among different persons, and is dependent in larger degree upon the condition of the peridental membranes and upon personal habits in the use of the teeth in mastication than upon muscular power. It has been my habit to make a trial of the force of the bite every year among the students of my classes and record the results. In these tests a familiarity with the instrument was brought out, and rivalry was pretty sure to occur among those of the highest strength which served to develop the full power of the occlusion. In a tabulation of results in one thousand persons, the average force exerted was 171 pounds on the molar teeth, and considerably less on bicuspid and incisors. In this



Fig. 10. Closed bite before and after treatment

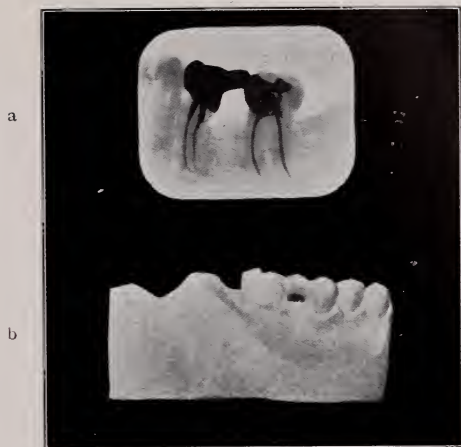


Fig. 12. (a) Mesial root of inferior first molar, used as abutment. Distal root amputated because of chronic abscess. (b) Model of case.

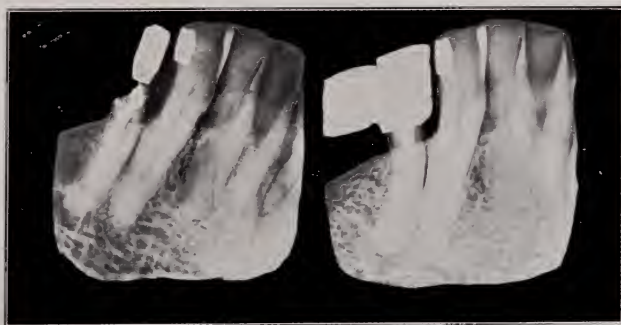


Fig. 11. Chronic abscess beneath bridge abutment.



Fig. 13. Unerupted cusps under bridges.

there was no selection of persons further than a careful exclusion from the trials of persons whose teeth were so badly weakened by caries as to cause danger of injury by breakage. In spite of this prohibition there were a few accidents to cusps of teeth that had very large fillings. The variation was from 25 pounds to 275 pounds. Two hundred and seventy-five pounds is the full register of the instrument used, and among the trials there were seventeen persons who made this full register. A number of these have registered a greater number of pounds. The instrument used is called the gnathodynamometer. A variation from accuracy of results occurs from biting very close to the end of the rubber pads or from catching too far from the ends, which may altogether produce an error of about ten per cent. With this exception, the instrument is as accurate as ordinary spring scales. In these trials, the instrument generally rests on two teeth in one jaw and but one in the other. It is only occasionally that it can be so placed as to rest fairly on two teeth in each jaw."

The force of the bite of an individual is modified very materially (1) by the use habitually made of the teeth; (2) by the loss of the pulp; (3) by disease of the peridental membranes. Nearly every one who makes trial of his bite on the gnathodynamometer stops because of pain in the peridental membranes rather than from having reached the full limit of muscular effort. Therefore, modification of the condition of these membranes is prominently brought out. Full and free use of the teeth in mastication, and especially the disposition to use them freely on hard foods, contributes to strength. Any considerable limitation of the use of the teeth, for even a few days, shows in tenderness of the peridental membranes; and, in cases where the person has fallen into the habit of swallowing food practically without mastication, the power of the bite will be found as low as fifty pounds, or even lower. Any considerable pressure causes pain. Very marked cases of this loss of power occasionally occur where persons who have fallen into the habit of disuse of the teeth because of exposure of the pulp on one or two teeth, which causes pain that prevents them from chewing their food. In such cases, bolting of food is liable to become habitual. This condition may be corrected by careful training.

In disease affecting the peridental membranes the power of the occlusion is rapidly reduced; that is, the muscles of mastication are held from exerting their full power by pain warning them to go no farther. A tooth from which the pulp has been removed seems never again to completely recover. Even though the person has not recognized the difference in the ordinary use of the teeth, it shows in these trials. The difference is generally considerable, but there are wide variations.

Therefore, the limitations of the force of the occlusion, as shown by the gnathodynamometer, is a register of the power of resistance by the peridental membranes, and not a register of possible muscular exertion.

Abrasion and How to Check It.

Abrasion (Fig. 5) does not always result from wear, such as the normal processes of mastication, or nervous grinding of the teeth. Some unknown influence is often responsible for the wasting away of seemingly healthy tooth substances.

My observation has been that in many cases, even when the bite was relieved, or entirely cleared, that the dentin on the cutting edge of the tooth would waste away just the same, leaving the enamel wall standing with a sharp outline.

This proved to me that some other causes besides the undue wear from the adjoining teeth had to be considered. When once the enamel is worn and the dentin is exposed, early treatment is advisable to check this waste of the cusps. Well made fillings or gold inlays of hard, alloyed gold will stop further destruction for many years. In raising the bite of such cases, the teeth on both sides of the mouth should be built up, and this should be done in such a manner that the "bite," or "occlusion," will be well balanced. The cusps should be restored in such a way as to prevent destruction, and usually ends in an edge-to-edge bite, or overbite.

Atrophy of the First Permanent Molars.

These teeth should be filled or crowned not later than in the seventh or eighth year. If not attended to, the spaces next to the permanent teeth cause much trouble to both sides. Gold caps or crowns should only cover the occlusal and lost surfaces. A few years later, when the crown of the tooth becomes fully

exposed, the gold crown can be replaced by an inlay or a longer crown to fit under the free margin of the gum.

In spite of the fact that so many dentists advocate the removal of pulps in all teeth to be crowned, I am still governed by my own observation, and by that of men of Doctor Black's type, not to follow such practice.

The radiograph has proven, beyond any doubt, our inability to treat or fill root canals successfully, even in the majority of cases. I have proven in my mouth, as well as in those of patients, that Doctor Black is right in his statements regarding pulpless teeth. Not until I see better results of my own and other practitioners' work in root-canal treatment and fillings will I indiscriminately destroy the pulps in teeth when crowning is needed.

My only reason for quoting from Doctor Black, who without a doubt must be recognized as an authority on this subject, is to impress on your mind *the folly* of believing that a pulpless tooth *is just as good* as a tooth with a healthy pulp. Especially in this work of restoring malocclusion, we feel tempted to remove pulps freely, sometimes for expediency only. It is better, however, to go rather slow and consider well the removal of a pulp, especially in cases of branched roots.

It is not necessary to have acute abscesses, fistulous openings, swelled gums, etc.; even without these signs the X-ray will show wherein we have failed.

Study all cases well at the start and finish by models and radiographs; for the success of a restoration, small or large, does not always lie in the visible, but often in the invisible, finished work. Without a *healthy foundation* and *good retention* no success can be expected (Figs. 11, 12, 13).

After giving you this brief outline and showing you some of my practical cases of the restoration of mal-occlusion, I should like all of you to remember that I feel that what I have said and shown here to-night is merely a suggestion of what may be done in this line. I hope that it may have awakened a new thought, in the mind of this or that fellow practitioner, causing him to undertake the restoration of occlusion, as outlined to-night, or, still better, that it may influence men to come forward and give us more light on this subject.

REPORTS OF SOCIETY MEETINGS

FIRST DISTRICT DENTAL SOCIETY OF THE STATE
OF NEW YORK

March 1, 1915.

A regular meeting of the First District Dental Society of the State of New York was held on Monday evening, March 1, 1915, at the Academy of Medicine, No. 17 West Forty-third Street, New York City.

The president, Dr. S. E. Davenport, occupied the chair, and called the meeting to order.

ADDRESS BY DR. A. M. WRIGHT, PRESIDENT OF THE DENTAL
SOCIETY OF THE STATE OF NEW YORK.

Mr. President and Members of the First District: I fully appreciate the honor of representing the Dental Society of the State of New York to-night. I find with every honor there is a penalty, and that penalty is the liability of being called upon at any time for an address.

There are three classes of men in this world: The drones, the talkers, and the workers. Unfortunately I have been associated with the last named class, working all my life, and have had but very little opportunity to get in 'close touch with the talking department, so I shall not have very much to say.

I do not feel like a stranger in a strange land, because I began attending the meetings of the First District Dental Society long before many of you began to wear molar teeth—way back in the seventies—when your meetings were always preceded by clinics held in the old S. S. White rooms on lower Broadway—clinics that brought out such men as Atkinson, Boedecker, Brockway, Straw, Hill, Jarvie, Francis, McKellops, Carr, Palmer, Barrett of Buffalo—all of them great, strong giants in early dentistry. As a matter of fact, they remind me of the Sequoias of the Pacific slope—grand old monarchs of the wild, that were born 3,000 years before Christ, whose tops were so high one had to look twice to see the crowns, and whose roots were twined around the Rock of Ages. The first time I saw them I thought I could spend half an hour; but before the time

was past I was ready to kneel in adoration of their mightiness. I thought half an hour would be enough, but I spent a day, two days, then another day, and when I tore myself away, my eyes were dim with tears out of respect to their grandeur.

As I look back upon the early days in dentistry, the men whom I have mentioned remind me of those trees. I wish the young men of to-day could have been in touch with those old monarchs of dentistry—I wish they could have known their uphill fights, their struggles against jealousy, the obstacles thrown in their paths by others in the same profession when they were trying to lift dentistry from a mere calling into a noble profession. I am sure the boys would then feel as I do about those monarchs.

The First District to me has always stood for everything that made for advancement and progress. The brightest thoughts of the brightest minds have been given to the world at large through the First District Dental Society. You, of course, have had your family jars, but what family has not—where there were so many persons capable of leading the procession? You cannot help it; but every jar has resulted in closer union.

In going through the State the past winter I found the district societies in a very prosperous condition. The attendance has been very large. The accession to our ranks greater than ever known before. In these visits, this thought has been constantly before me. Are we doing all we can or should to make our meetings interesting to the young men? Are we doing all we can or should to induce the young man to think for himself—to write and talk more than they do at the present time? Are we forgetting that a district society is, to a certain extent, a kindergarten for the development of young men to take their place in the State and National societies, as well as in their home districts? Men have said to me, "Why, the boys that are coming into the societies to-day cannot write or talk." To me that is perfectly preposterous. There are gray heads present who can remember when the preliminary qualifications for the dental matriculation were the three R's—and very poor at that—and, at most, two terms of seven months got them their degree. Look at the change! To-day the boy must have passed three years in

the grammar schools, four years in the high schools—the finest place in the world for developing the young man—and then three years in the dental college. Then he passes his college examination, his Regents' examination for a license; and you do not mean to tell me he has come out not knowing anything! Why, we have the keenest, sharpest, and brightest young men in the world coming into the profession to-day, and it only needs a little urging, and a little coaxing, and a little reaching out of the older man's hand: "John, that is well for the first essay, or the first talk. Try it again, my boy."

And if you will excuse the expression, I would say d——n the man who undertakes to throw a cold wet blanket over the aspirations of any young man who is trying to do his best, when he should receive only words of commendation and encouragement!

I think many of our papers are like some sermons we hear: they float over the heads of the audience. The minister to-day who preaches constantly about high theology very shortly does so to empty pews, and justly so; and I think some of our papers are too much founded on high theory. It would have been better if the writer had digested them, and tested them, before giving them to the public. Do not think for a moment that I am opposed to the work of the scientific research committee. I am not; but I want something at every meeting that is good for the boys to take home and digest, to take right to the chair tomorrow, and turn it into dollars and cents.

I presume it is almost sacrilegious to talk about dollars and cents before a dental society. I remember a number of years ago, attending one of your meetings, and a gentleman spoke of his work, and said he never took that into consideration, but worked for the glory of God and the benefit of mankind. Another gentleman got up, and said he worked for the glory of God and the benefit of mankind—and he was mankind. He said, "If a patient comes to my office, and wants an examination, I look over his or her work and estimate the expense—if they want to know—and then I get right down to business and do the best work the Almighty put it into my hands and brain to do. I, too, am working for the glory of God and the benefit

of mankind." I have admired that man ever since, and he is Dr. W. W. Walker, of your society.

You all know we have the best State dental society in the world, even though it be not the largest. We hope to have the coming meeting the finest one that has ever been held, and I want to say to you that I expect to see all of you present in Albany next May.

I thank you for your kindness.

Dr. Stephen Palmer, of Poughkeepsie, vice-president of the State society, also made a short address.

The papers of the evening describing the Forsyth Dental Infirmary for Children were then read by Thomas Alexander Forsyth, Esq.,¹ and Harold De W. Cross, D.M.D.,² of Boston.

Discussion on Mr. Forsyth's and Dr. Cross's Addresses.

Dr. Herbert L. Wheeler—After listening to the words of Mr. Forsyth and Dr. Cross, I find myself in a condition of conflicting emotions. There have been so many details mentioned in Dr. Cross's paper, and shown in the beautiful illustrations, that one is tempted to give his time to a discussion of the various problems there presented; but there will be so many who will consider that side, and there is so much to be said on that subject, not only now, but in the future, that I have resolutely made up my mind to discuss more particularly the phase of what I consider the marking of an epoch in the development and improvement of the dental profession, and from that point of view, I will discuss this question in a comparatively few words.

When one thinks of the Forsyth family, and all they have done—laymen, not dentists, who have taken the interest they have—and the assistance they have been to mankind, and have chosen the dental profession to help work out their ideas, one cannot help but look back and see what our opportunities and possibilities have been in the past, and then look forward and conceive, if possible, what they will be in the future, because of what has been done by this remarkable family.

If it were not for the great capable human characters who

¹ See p. 167, this issue of THE JOURNAL.

² *Ibid.*, 170.

tower to such heights that they see above and beyond the mists that envelope most of us, the accumulated experience of the ages could not be focused at one small point.

Were it not possible to organize the facts of past knowledge into a comparatively small circle, research work—grand institutions and the equipment of these institutions, so research work could be pursued—would not exist, and both mankind and the profession would suffer accordingly. We cannot, therefore, discuss the subject of this evening without considering the strong characters in our profession who have, through their struggles, been able to accumulate for and organize institutions which give the opportunity for the kind of work that will make it possible for our profession to press onward and upward in the service of mankind.

There have been three striking examples of this type of men in recent times. Because of their work for the dental profession they will go down the ages as men who helped emancipate the dental profession, and conferred a blessing upon their fellowmen at the same time.

By a strange circumstance, one of these men, or I had better say a family of these men—are not even dentists; but who will deny that some dentist or dentists of high ideals must have made a wonderful impression upon these unusual characters?

Laymen, with no tie that bound them to our profession—seeing with the vision of prophets—almost before the dentists saw it—the necessity for preventive work in the mouths of the children of the city's poor; feeling rather than knowing that if these future citizens of our beloved country were to have a chance in the world they must have good health, and that to have good health, the gateway to the stomach must be guarded. Then like great men who look into the future, seeing the magnificent results that are to come from properly conducted effort now, they act without precedent, without even a blazed trail through the wilderness, they go straight to the point and with the courage of their convictions, plan and build that beautiful building, wonderfully equipped, known as the Forsyth Dental Infirmary. It is a monument that will write these gentlemen's fame upon the hearts of the citizens of the beautiful city of Boston, for generations to come, and it deserves to be written there.

Can a beautiful, artistic, good and useful institution like this be reared in an American community and not inspire and ennoble the citizens of that community? I think not. How much more then shall it inspire and ennoble the members of the dental profession?

Can the years be numbered in which it shall be a center of inspiration calling upon us to do better things? I am sure you will say with me they can not. Who shall say what the effect of the lives of these gentlemen shall be upon the future? Certain we are that their influence will be for good when they are gone, as when they were living. How much the good may be multiplied depends upon the character and efforts of those who are to follow. We cannot but believe that such good seed will fall upon fertile ground, and that our beloved profession will

See a light—will catch a gleam

Of that true life which seeks to conquer pain,

And serving others, be itself redeemed.

Dr. Haven Emerson, Deputy Commissioner, New York Board of Health—I have had the pleasure in time past of being present at some of your meetings, and once—I think at a joint meeting of the First and Second District Societies—the question of the establishment of dental clinics came up. I had examined that summer and counted the defective or missing teeth in 3,000 children, whom I had examined for admission to one of the seaside hospitals, and I found between 60 per cent. and 70 per cent. of the teeth defective. At that time no question of the proper care of those children's teeth was considered. I made a plea to one of the dentists of my acquaintance, and others, for the establishment of dental clinics, and I think it was through Dr. Wheeler's energy that they were shortly afterward established. The question came up as to whether the dental profession would support them, and the answer that was given then has been given by countless dentists since then; and I think the addresses of this evening, showing the establishment of this great institution in Boston have given the final answer.

The question was asked "Shall dentists be required to give their assistance to these clinics, as the medical men do in other clinics?" and the answer was that dentists are obliged to offer their services in dental dispensaries; and the result shows that

the inevitable philanthropist, the inevitable far-seer among the laymen, has come forward and assisted in this work.

I am disappointed that again Boston should have scored one on New York. It is inconceivable that New York should not have one as good as Boston—that this responsibility should not have been met here. In spite of that, we are running Boston a pretty good race for health conditions, and as 1914 closes, we have done something by our babies that no town or city has done before. We have accomplished a record. Only 94 out of every 1,000 born have died within the last year, and no other city of over 500,000 inhabitants has yet shown that. It is up to us to continue that—not only through the milk age, but through the chewing age; and we expect to see those children as well cared for in their school life, or their pre-school life, as they were cared for by the nurses in their prenatal life. I consider the most effective work that has been done so far for the sake of the school children has been by the nurses before the children are born.

To continue that, it is necessary for us to insure their nutrition. Perhaps you do not realize that one of the responsibilities of the Board of Health is to issue certificates for children over fourteen, and who have not yet reached sixteen—to secure employment. Of the 30,000 and upward who apply, many are below normal for their age and race in height and weight and strength; and we attribute that to the preparation of the food in their mouths. It is not that there is not enough food to go round, but not enough teeth to prepare it. Aside from the possibilities of secondary infection, and the resulting anemia and sepsis, there is abundant evidence that malnutrition is in part due to lack of oral cleanliness.

To meet that there has been the effort that was moderately supported by the Board of Estimate, the establishment of dental clinics for the school children. In spite of the lack of support of this activity, there has been a decided improvement in the children who have been under such care. It is a question how we may best meet the needs in the future.

There is another experiment going on in New England, which seems as important as the establishment of this institution in Boston, and that is the work in Bridgeport by Dr. Fones. In

this experiment there is a social work being done as you know by nurses, or those acting as nurses for him, and they are making a decided improvement in the mouths of the children there.

If we are to proceed in the present temper of the authorities of the city, we must get some assistance. There is only one class of nurses in the employ of the Department of Health, and those are appointed after competitive civil service examination from among the trained nurses, so it is likely, if we can get assistance from the dentists in the future, that there will be some spreading of this activity.

The further work that this department was interested in, has been the experimental work undertaken by the Bureau of Laboratories, as to the advisability of using vaccines and emetin in the treatment of advanced infections of the teeth and gums. The work of Dr. Park is directed towards learning to what extent we may prevent or assist in cases of mixed protozoan and mixed bacterial infection.

I wonder if you realize to what extent the problem of the unemployed is concerned in this thing. The loss of a man's job may come from a bad foot, varicose veins, or from sore teeth. The person who keeps his job in hard times is the person who has no handicap; and we are trying to improve the condition of those who are so handicapped.

One of the things I should say would naturally fall to the lot of this great experimental work in Boston—something that we feel very keenly in New York, is the need of testing and reporting on the value of proprietary and patent medicines used in preparations for the mouth. The amount of money wasted in the community for unnecessary and superfluous patent remedies, for service which could be just as well rendered by preparations of extremely moderate cost, would support many a dispensary. There are many advertisements and exploited materials which are misleading and deceptive; and I should think an institution of the kind established in Boston might easily make of itself a place which would set standards of articles which should or should not be used.

Antiseptic mouth washes, which are good for washing the floor—powders that are very good for polishing a ship's deck—articles that would be more suitable to use on a fence than in a

reputable dentist's office—would then be given publicity, and people would know what they really are, and it would go very far towards establishing standards of materials.

There are certain things that are always used. The ingenuity of pharmaceutical houses is always towards improving those things, and those that are useless can be warned against.

The work done in investigating mouth washes for the pneumonia tests some years ago, and the studies of Dr. Wadsworth and others, showed just how useful almost all the commonly used so-called antiseptic mouth washes were. They were tested and found wanting, and their value from the medical point of view was exploded at that time. The more we see the connection between the respiratory diseases and the bacteria in the mouth, the more it seems important that there should be persistent and constant study of these medicaments.

A further study that should come particularly from this institution in Boston, would be the test of nutrition as an improvement in oral conditions. A great institution in Boston to which scientists look for the most recent discoveries—a great work under Dr. Benedict and his fellow-workers there, would be supplemented by the work undertaken at the Forsyth Infirmary. I hope we may hear that some such co-operation is taking place. Boston has an enviable reputation for the work being done in the study of nutrition, and nothing is more important than the study of mouth conditions in connection therewith.

It was mentioned that the institution in Boston was likely to increase dental practice, and the income of dental surgeons in the vicinity of Boston. I think myself that in the future we must look to the administration of dental and medical services more and more for the sake of the citizens. Our taxes are high partly in proportion to the number of people who have been neglected in their youth. People who are suffering from such neglect make a burden on the tax payer.

The grouping of the work of skilled dentists and physicians will be of more value than the workings of isolated units. Look at the work of the University of California, where 7,000 boys and girls give \$5 a year each, making a fund of \$35,000. Those

people get better care than the wealthiest people. They get the service of immediate co-operative medical and surgical skill, at once. The great commercial institutions, the large department stores, are all beginning to realize that their staff efficiency depends on the medical and dental care their employees receive. One store in this city has a most perfect unit for the benefit of its employees.

The Department of Health has made a beginning in the physical examination of their own employees. We have not yet reached the dental care of the employees, but it is to be hoped the example of more wide-awake institutions will be followed.

In the description of the great Forsyth building, I saw no place marked off for a publication office. I should think a publicity bureau, an educational department, would be a very necessary thing. I believe after the first preparative stage has been worked through, that they will find there should be established a place from which every morning teachers should go out to the schools, and among the pupils and parents.

I have no doubt that the future will have many surprises for those who planned the building, and they will find they have on their hands an educational institution, as well as a surgical institution, and that they will want a great lecture hall in addition. The spoken word goes a great distance in connection with the work being done there.

I hope the educational propaganda will be added to the equipment of that institution.

I thank you for the privilege of being here, and of speaking.

Dr. Thaddeus P. Hyatt—It is a privilege to have the opportunity to express my sentiments in regard to the Forsyth Institute. I had the great pleasure a few days ago of going to Boston and spending a day in the building, and watching how the work was being carried on. I fully realize I was one of the early visitors, and that the work was not in running order; but one cannot help being impressed with the broadness and completeness of the plan and scope, and the beauty of its surroundings and its equipment. As you see that magnificent building, and go inside and note the marks of thought, care and judgment used so that every part of that building can be kept perfectly

clean; as you realize that all of this usefulness and beauty is for the purpose of helping children, making them healthier and happier, a feeling of exhilaration and delight passes over you; but this feeling is also accompanied by a deep sense of reverence.

As I stood in the hall and saw those beautiful chairs—the ideal of utility and cleanliness—and those men working for the children, I understood that at last some human had realized the opportunity of rendering to mankind the greatest service man has yet given to his fellowmen. This long neglected mouth of the human race is being found, day by day, to be the most important part in its relation to the health of the whole body; and it is amazing that we have wandered so long through the mist of ignorance.

I am glad to have met Mr. Forsyth, and to thank him and his brothers that they have given to the dental profession this splendid opportunity, because there is no greater service in life than to help our fellowmen.

While visiting the Institute I found no lectures were being given, and you all know this is a hobby of mine. When I saw all those children in the children's waiting room, I could not help gathering a number of them together and giving them a little talk on mouth hygiene. I hope soon there will be a continuous performance there, continued lectures going on all the time; and if any of you have not been in a schoolroom and seen and heard 1,200 to 1,500 children listening to these lectures you cannot know how interested the children become.

I had the pleasure recently of spending a day with Dr. Fones, and I am glad Dr. Emerson referred to Dr. Fones because he is doing a magnificent work in Bridgeport. They are giving prophylactic treatment to the children in the Public Schools and then the children go to their own dentists for the other necessary work. They also teach the children the tooth brush drill so they may know when and how to clean their own teeth. I hope to see the time when the prophylactic work will be as important a feature in the Forsyth Institute as the radiograph or any other department. I heard Dr. Fones lecture to about 1,500 children. They came marching into the room to their seats to the music of the piano. The interest and attention they gave would convince

anyone that the subject of mouth hygiene is not a dry one, but is of the greatest interest and value to them.

I do not think I can add anything to what Dr. Emerson has said. He told us many good things; but the one that impressed me was about the publication department. I hope each case will be followed up. Here is Tommy Jones, who comes in with a bad mouth. Find out his record in school, and how often he has been absent. Follow up his record, and note what is the improvement in his lessons, his behavior and his health. We have records from Germany that show children are better behaved after their mouths are put into good condition, and that they obey more readily than children whose mouths have been neglected and uncared for.

It has been conclusively proven, I think, that there are many immoral attributes brought about by the irritation of the periphery of the dental nerves, even when the person has not been conscious of any pain.

I remember what Dr. Upson said about the case where the boy had no pain at all, but he had impacted molars, and he became a thief and a liar. When his impacted molars were extracted, he became a much improved boy, and will no doubt develop into a good citizen.

I sincerely hope the Forsyth Institute will have a publication department, and follow up the records of the children who come to it.

I think every man shares with me the feeling that this marks a new era in the history and development of dentistry as a profession and a science, and all credit is due to the Forsyth family for the opportunity they have given to us. I think that in the history of dentistry the name of Forsyth will be a part and parcel of all that is good in the development of the profession; therefore to them, great honor.

Dr. McCullough, Philadelphia—It is not possible for me to add to what has been said in admiration of this grand institution. I shall speak simply concerning the value of this work.

Much of it has been guessed at. Much of the direction of the oral hygiene movement for fifteen years has been based upon a premise that is wrapped entirely in assumption. Much of the

result of the oral hygiene movement would have been greater, I think, if it had been truer. The consequences have been effective and interesting in that they show how slowly truth travels.

While the prophylactic treatment is of course of immense importance, it is not the only thing, because the use of the tooth brush, and the use of the mouth, will not remedy structural defects in the teeth, which in the younger children are due to the formation of the teeth, and that are due to the premature extraction of the first permanent molar. As I reported at Buffalo some years ago, I found that 23,000 first permanent molars were decayed at the ages of six, seven or eight years. I found where the teeth were just erupting, that fine probes would find spaces in the not yet completely decalcified envelope, so that as soon as the teeth erupted, they leaked, and fermentation completed the work. This explains why at seven or eight years, children in a thickly populated community lose their first permanent molars. In such cases the tooth brush is without avail.

A further clinical examination of how far the tooth brush was effective—in examining teeth that were without caries, and had not seen a tooth brush, and teeth which had caries and had been brushed—showed that where the teeth were carious and the brush had been used, the use of the same was not apparent.

I think this municipality will discover this is an economic proposition, so far as carious teeth are concerned.

I do not think that the infection of carious teeth affects the general health, as far as we are able to prove; but I think the absorption of infection from alveolar abscess, which 90 per cent of the children have in such cases, is the cause of the general debility which is charged to the child, without finding any cause for the general debility.

I find the general debility can generally be cured by removing the pus from the mouth, and not by the removal of toxemia in the alimentary canal.

I am impressed by the fact that in hospitals, children after forty-five days, following a normal case of scarlet fever, are kept in nine months, sometimes with nothing else than a moist nose. Latterly, the European talent has looked upon the moist nose as a more serious menace than the desquamating skin. I took a

number of cases that had apparently returned to good health, with the exception of the moist nose, and I cleaned up the pus conditions.

I have some data which I shall present later, that is a striking suggestion as to the retention of this pus in the mouth, and the mouth being a source of infection for an indefinite time after these children are discharged.

Adjournment.

FREDERICK C. KEMPLE, D.D.S.
Editor, First District Dental Society.

THE JOURNAL OF THE ALLIED DENTAL SOCIETIES

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No. 2

EDITORIAL DEPARTMENT

"WORKING ON THE PLUS SIDE OF HEALTH"

Much has been said recently concerning the dependence of the individual's working efficiency, of good citizenship—of human happiness—upon a sound body; and further it has been shown by evidence which is overwhelming that one of the prime requisites of bodily health is a clean mouth, armed with thirty-two teeth in normal occlusion. Animal life cannot exist

without air and food, yet through a peculiar trick of the human mind we look upon these things as matters of academic interest, and not to be compared for a moment in importance with the state of the stock market. Man boasts the gift of logic, but frankly is not interested in the proposition that *health* is the basis of life, individually and therefore nationally—the lack of which blots out all that makes it worth the while.

Eight hundred thousand future citizens of this Republic now attend the public schools in New York City. Something over ninety per cent. of these children are subjects of incipient or established dental caries. Unless averted by a miracle, in ten years time over seven hundred thousand of these same children will enter manhood and womanhood with incomplete or seriously impaired dentures. Teeth which are badly decayed or abscessing can only be restored to tolerable health through operations which are expensive and therefore beyond the reach of, perhaps, this same proportion of individuals having reached adult life. Inevitably, therefore, so long as poverty exists with man, it will be true that established caries will go from bad to worse, and that the general health of the individual, with all that that means, will be reduced thereby either more or less, but always reduced. It is true that some individuals who inherit superior vitality appear to thrive in spite of serious dental defects: the toothless nonagenarian is a possibility; a few of him exist, undoubtedly. Occasionally, too, one of those copper-

fastened patriarchs announces that the secret of his longevity has been the daily glass of whisky. What he would have been with good teeth and no whisky, must be left to the imagination. These illustrious examples show, indeed, the exceeding toughness of the human frame; *not* the desirability of abusing it.

Not only is it a financial impossibility for the authorities to provide the means of treating and filling the millions of diseased teeth possessed by the children of our great city; it would be an economic absurdity, except as following the education of the individual child to the point of understanding that he must thereafter be the chief guardian of his dental apparatus. The restorative work of the dentist cannot be compared in importance to the life habits of the patient in the care of his mouth. To treat the diseased teeth of an ignorant child as an isolated act, leaving him then to his own devices, would be about as far-reaching in ultimate good as to give a vagrant his night's lodging, with no thought concerning what may become of that man on the morrow.

This does not belittle curative measures, but reminds us that prevention is always better than cure. And it is a blessed fact that prevention is infinitely cheaper. Furthermore, prevention of dental caries—relative though not absolute—is practicable, through education of the child in cases where the family condition is above that of destitution. Oral filth probably is not the only factor in the production of caries, but it is

such an important one that the preventive effect of *mechanical cleanliness* has become axiomatic. The best answer to our problem at this day is the tooth brush, with knowledge of its use.

That valiant champion of oral prophylaxis, Dr. A. C. Fones, in a recent address before the Committee on Child Hygiene of the Advisory Council of the New York Board of Health, gave an inspiring report of results obtained in the schools of Bridgeport, Connecticut, through systematic tooth brush drill, following initial cleansings of children's teeth. The practical and educational work was performed by nurses and supervisors trained by Dr. Fones, and consisted in the polishing of the teeth in the first place by stick and pumice, then a practical drilling of the children in the correct use of the brush. Competitive drills, with the award of prizes for best classes, etc., were organized by the schools—the whole thing becoming an interesting game to which the children responded so keenly that substantial results had been obtained. Most important of all, they were learning that invaluable life-habit of keeping the mouth clean. "We are working on the plus side of health," said Dr. Fones—and therein lies the kernel of the nut.

The excellent work of the New York Board of Health in the establishment of dental clinics and in attacking the dental problem in this immense community has been seconded very effectively of late by the Department of Education. The week of May 24 to 29

was appointed "Dental Hygiene Week," and on each day elaborate programmes for the teaching of children and their parents the use of the tooth brush were carried out in each of the four hundred and fifty schools in Greater New York. This, we understand, is to be an annual event, as the culminating point in the year's school work in oral hygiene. As this plan becomes perfected the cumulative benefit to rising generations will be great beyond calculation.

We are aware that the spectacular aspect of the tooth brush propaganda has been criticized as an over-zealous "flourish of trumpets"—superficial "clap-trap,"—even undermined, in certain quarters, by unworthy motives. "Flourish" or not, it is a move in the right direction; better than the nothing which existed before, in an educational way, and therefore best until improved upon as a means of overcoming the vast inertia of ignorance.

The starting point, then, in public oral hygiene measures must be this training of the child: disease must be *prevented*, and this is possible only in the young; with the adult it is too late. We must teach the youngster to protect and strengthen the "fighting edge" of his vital forces which are to carry him through a world in which the fittest survive.

CORRESPONDENCE

SUMMER COURSE OF RESEARCH IN DENTOCHEMISTRY

*Biochemical Laboratory of Columbia University,**College of Physicians and Surgeons,*

NEW YORK, May 31, 1915.

DEAR DR. DUNNING:

In an introduction to a series of short papers under the general title, "Biochemical studies of saliva and teeth," which was published in your journal last September (Vol. ix, p. 347), I referred to the fact that the papers in that series had resulted from an *impromptu course of research in dentochemistry*, in the Biochemical Laboratory at the Columbia Medical School, during the summer session at Columbia University in 1914. In that introduction I alluded to the situation which led to the inauguration of the course and named the students who, "by becoming the innocent victims of this academic innovation, helped to write the first page of a new chapter in the history of dental education and science." I suggested that this formal course of research in dentochemistry was probably the first ever offered on a basis of academic (Ph.D.) credit. I commented on the "far-reaching possibilities in behalf of dental education and dental science from a development of such courses of instruction in research in dental subjects." I stated that "we shall aim to carry forward certain contemplated plans for the development of a strong course of research in dental chemistry in this laboratory, as a matter of academic and scientific justice to the dental profession, small though the influence of such a course may be, and also as an opportunity for active service on our part, as a university, in behalf of dental science;" and added an expression of hope that I might be able "to find time to outline the details of an extended course of this kind to be given here next summer (1915), for publication in an early issue of this Journal."

Realization of the hope expressed in the concluding phrase above has been prevented heretofore by continuously urgent demands on my time by our researches but, before I lose my last opportunity to return to this matter in the way suggested (prior to the opening of the next summer session), I desire to present the following statement, brief and general though it may be, for the information of any who may have noted my previous remarks on the subject.

There were 5,590 students in attendance at the summer session of Columbia University in 1914. There is every prospect that there will be more than 6,000 students at the session this summer. It is obviously immaterial to the University, *financially*, whether or not any one attends the proposed course of research in dentochemistry.

The sixteenth summer session of Columbia University will open on July 6 and close on August 14, 1915. The fee for matriculation, tuition and laboratory supplies *for the course in dentochemical research* is \$50. No portion of any fee paid by students is ever received either directly or indirectly by any instructor. The course will be given daily from 2 to 5 p.m. Students desirous of devoting the mornings also to the work may do so, from 9 to 12, *without extra charges of any kind*. A copy of the official summer session Announcement will be forwarded by me to any one who may indicate a wish to examine it.

It is proposed to conduct the course of research in dentochemistry for 1915 along the lines indicated by the following general subjects:

1. Composition of saliva: Current methods for both its qualitative and quantitative chemical analysis. [A *comparative* study involving "best" methods for the estimation of water, total solids, organic matter, ash, acidity, alkalinity, viscosity, total proteins, coagulable protein ("albumin"), mucinate ("mucin"), glucose, reducing substances, calcium, sulfocyanate, nitrite, bicarbonate, chlorid, phosphate, excretory products, putrefactive and fermentative derivatives, etc. Microscopic methods will also be used and shown.]

2. The influence of food materials, beverages, condiments, drugs, etc., on the secretion (rate, volume, composition) of saliva. (The experiments on students by students will be amplified by demonstrations on animals.)

3. The chemical composition of teeth. (Procedures and methods for the complete qualitative and quantitative analysis of whole teeth, enamel, dentin, and pulp, including microchemical operations.)

4. The permeability of enamel to substances in the saliva, with special reference to the entrance of bacteria, phosphate, pigment, etc., "from the outside," and to the obvious dental inferences to be drawn from *positive* results in this connection.

5. The passage of ingested and injected substances, such as trypan blue and arsenic, from the blood and pulp through the dentin into the enamel, with special reference to the possibility that enamel is continuously subject to "influences from within."

6. The chemical influences of oral bacteria on saliva, on food residues in the mouth, and on teeth. (Bacteria will be isolated and cultivated, and the effects of individual types determined.)

7. The utility of dentifrices and anti-septic agents for the induction and maintenance of oral anti-sepsis. (Experiments to show the inefficiency of all current methods to this end.)

8. The bacterio-chemistry of tooth brushes as commonly employed. (Experiments to show the bacterial condition of tooth brushes in active use.)

9. The chemical composition of materials used for filling teeth, with

special reference to the effects, on such materials, of saliva, food constituents, beverages, condiments, drugs, antiseptics, bacterial products, etc.

10. Effects on oral bacteria of substances dissolved from filling materials by saliva.

11. The nature and composition of dentifrices, with special reference to their effects on flow and composition of saliva, on oral bacteria, teeth, filling materials and oral membranes, including demonstrations of methods in vogue for two years for the determination of the effects of food-acid and other media on natural extracted teeth.

12. The effects, on teeth and fillings, of food materials, beverages, condiments, drugs, antiseptics, bacterial products, various dental supplies, salivary solutions of metals used in filling materials, etc.

13. Methods for the extraction and identification of particular substances from saliva, teeth, salivary glands, oral membranes, tonsils, etc. (Special attention will be given to mucin and its salivary salts.)

14. Effects of "deficiency" diets on the rate of development, dimensions, outlines, hardness, weight and composition of teeth. (Experiments on white rats, with food deficient in calcium or phosphate, or both, with demonstrations of the details of the nutritional procedures.)

15. Effects of disturbances of internal secretions on the rate of development, dimensions, outlines, hardness, weight, and composition of teeth. (Experiments on white rats, with special reference to the effects of feeding ductless glands and of the removal of parathyroid glands, etc., with demonstrations of the details of the nutritional and surgical procedures.)

A weekly seminar (2 hours) will be devoted to formal presentation, by instructor and students, of results of recent dentochemical researches as described in current literature, with critical analyses and discussions in each case of the validity and adequacy of the methods employed and the conclusions stated. (The seminar is intended to demonstrate the logical steps in the process of subjecting to rigorous scientific analysis any series of conclusions from a given group of observations—"facts.")

Additional subjects will be "offered" by the time the summer session opens. It will be physically impossible, of course, to execute the whole of this or any such comprehensive program during a summer session. It is not expected that more than a few items under each head can be given adequate attention. Students will be free to select the themes most interesting to them individually, and all in attendance may be engaged on different problems at a time, if that should be their collective preference. Our purpose will be to "make haste slowly" and to emphasize *accuracy and thoroughness above every other consideration*. I shall conduct the course in person, continuously.

Candidates for admission to this course must have a good working understanding of the *principles* of chemistry and *must be able accurately*

to conduct quantitative chemical analysis. Serious deficiency in these respects would make the course a waste of time for the student, and the student himself a nuisance to his associates.

The course is intended to afford suitable and stimulative biochemical training for prospective investigators in dentochemistry. The course will be conducted with every other purpose subordinated to that.

It may interest your readers to be informed that there have already been three awards of the degree of Doctor of Philosophy, by the Faculty of Pure Science of Columbia University, to students of biological chemistry whose dissertations have been devoted to dentochemical research. The names of these candidates, with the subjects of their dissertations, are appended:

Max Kahn, M.D., A.M., Ph.D. 1912: Biochemical studies of sulfo-cyanates. (Dr. Kahn is now pathological chemist at the Western Pennsylvania Hospital, Pittsburgh, Pa.)

Edgar G. Miller, Jr., M.S., Ph.D. 1913: Studies in pathological chemistry.—III. Studies on dental caries. (Dr. Miller is now associate in biological chemistry in this laboratory; also acting director of the Chemical Laboratory of the Beth Israel Hospital, New York City.)

I. J. Kligler, A.M., Ph.D. 1915: A biochemical study and differentiation of oral bacteria, with special reference to dental caries. (Dr. Kligler is now an assistant in bacteriology at the Museum of Natural History, New York City.)

William A. Perlzweig, A.M., at present an assistant in biological chemistry in Columbia University, is about to fulfill the requirements for the Ph.D. degree with a dissertation on the effects on teeth and bones of diets deficient in various important elements, and will doubtless receive the degree in October.

Louise C. Ball, B.A., at present a candidate for the degree of D.D.S. at the College of Dental and Oral Surgery of New York City, is also a candidate, at Columbia University, for the Ph.D. degree, and is engaged in research in dentochemistry at both institutions under my guidance.

Dr. Percy W. Punnett, who receives the Ph.D. degree in chemistry at Columbia this week, has co-operated with me since February in dentochemical research, with reference particularly to the validity of methods for the inorganic analysis of teeth. Misses Lottie M. Hull and Jeannette C. Mullikin, successful candidates for the A.M. degree, have been co-operating in research on the activities of oral bacteria. Mr. L. A. Shepard, a candidate for the M.D. degree at Columbia University, and Mr. Sol Biloon, a senior in the College of the City of New York and a prospective candidate for the M.D. degree at Columbia, have helped me very effectively, since February, in studies of saliva in its possible relation to caries. Mr. Gustav Egloff, a candidate for the Ph.D. degree, has been proceeding, under my guidance, with determinations of the values for surface tension

of saliva secreted under various dietary conditions. Dr. Edgar G. Miller, Jr., associate in biological chemistry, has been co-operating in our work on internal secretions under the auspices of the Dental Society of the State of New York and the Scientific Foundation and Research Commission of the National Dental Association; also in a furtherance of the study of dental effects of food-acid media under the auspices of the First District Dental Society of the State of New York.

It is a great pleasure to refer to these evidences of growing practical interest in subjects of dentochemical research at Columbia.

Hoping that THE JOURNAL OF THE ALLIED DENTAL SOCIETIES is rapidly acquiring the support that *professional* journalism merits from the dental profession, I am, with my compliments to the members of the Allied Dental Societies,

Yours sincerely,

WILLIAM J. GIES.

NOTES ON PRACTICE

COMPILED BY WILLIAM D. TRACY, D.D.S.

Management of Pulpless Teeth.—Do the very best root canal work that you can in each case, and check it up by a radiograph. If the radiograph shows that your root canal is imperfectly filled, make regular examinations of that area by radiography from time to time, and if the tooth in question is found to be infected at any time, extract it. My feeling is that we should not run the risk of infection from badly filled root canals if we know it, and that rather than to expose a patient to the risk of constitutional infection from such badly filled root canals, we might better sacrifice the tooth. This is not to be interpreted, however, as a recommendation for the wholesale extraction of all dead teeth. We may be compelled to come to that in time; but we should not jump to the conclusion that it is an absolute necessity until further research work has been done, which will settle beyond a doubt what our line of action should be, in order to be fair to the patients who entrust themselves to our care.—T. B. HARTZELL, *Items of Interest*.

Dissolving Plaster from a Vulcanite Plate.—The last traces of plaster can be entirely removed from a plate by placing it in a solution of hydrochloric acid, two parts, and water, one part, for five minutes. The plate is then cleansed with a stiff brush.—*Australian Journal of Dentistry*.

Taking Impressions with Modeling Composition.—When the composition has been properly molded on the tray, the external surface of the tray is immersed for a few seconds in cold water, thus preventing the heated metal from causing discomfort and pain to the lips. After drying, the surface of the modeling compound is dusted with French chalk of fine quality, and the impression is taken. This method produces an impression of very fine definition, the composition does not stick to the teeth, and the result is pleasing to both dentist and patient.—P. M. COUGHLIN, *Commonwealth Dental Review*.

An Adjunct in Pressure Anesthesia.—Sometimes when attempting to extirpate pulps under cocain pressure anesthesia, the pulps remain sensitive, as in idiosyncratic cases. I find that 95 per cent. alcohol instead of cocain acts immediately in producing the desired anesthesia in such cases.—A. S. CAMBAGE, *Commonwealth Dental Review*.

Finishing Amalgam Fillings.—Complete your operation by thoroughly trimming all margins flush, and thoroughly and carefully polishing the filling the same as you would polish a gold filling of which you were proud. It will be better for the tooth, the patient, and the dentist's reputation. Anything that is worth doing is worth doing well, and one could not be justly proud of an amalgam operation unfinished. And last

have the courage and manhood to demand a fee which will be a fair compensation for the good you have done. If you do not get such a fee, you will surely hesitate to do your best and improve on your operations in the future. There is no filling material with which we can do as much permanent service for our patients in a given time as with amalgam.—W. G. CRANDALL, *Items of Interest*.

Concerning Emetin in Treating Pyorrhea.—At the present time, judging from the reports that have reached me, the best routine treatment is as follows: 1. Inject subcutaneously every day for three days, as advised by Bass, $\frac{1}{2}$ grain of Emetin Hydrochloride, in aqueous solution. This dosage is now obtainable in ampules ready for administration. Following the three primary injections, give a hypodermic ($\frac{1}{2}$ grain) every four to seven days for at least a month, and as much longer as the local conditions may warrant. 2. The dentist should inject into the gingival sacs, two or three times a week, $\frac{1}{2}$ per cent. solution of Emetin Hydrochloride. The same solution may be used by the patient at home, and may be conveniently applied with a pledget of cotton on a toothpick, the solution being well rubbed into the diseased tissues. The teeth, of course, should be carefully cleaned daily in the usual manner. The patient should be provided with the Emetin solution after apparent cure, and he should be directed to use it himself to prevent recurrences. 3. The appropriate dental treatment, of cleaning, scraping, or scaling, together with applications of iodine or other antiseptics, as usually advised, is indicated in severe cases. Such treatment will hasten the cure—a cure which otherwise might be delayed. 4. Emetin, while powerfully amebicidal, is probably not antiseptic, and inasmuch as there is a probability of mixed infection in severe cases, it may be, and probably often will be, desirable to associate the Emetin treatment with the use of mild bactericidal agents locally.—A. S. BURDICK, M.D., *Oral Hygiene*.

Investing a Cast Cusp Crown.—In casting the cusps of a gold crown, the sprue can be inserted from the inside of the band to the under cusp surface of the wax. By inserting it here, when cast, the cusps will be free from a sprue mark and can be easily polished. A bur will cut off the sprue. In long crowns, with this method of attaching the sprue, the band will not be as near the bottom of the casting ring.—F. S. DILGER, *Dental Review*.

Applying the Rubber Dam.—Doctor Van Woert, when placing the rubber dam for root canal work, first cleanses the immediate region thoroughly with an antiseptic soap. He then paints it thoroughly with tincture of iodine. He then lubricates the hole in the rubber dam with a little carbolized vaseline. This makes the placing of the dam and clamp a sterile or non-infectious procedure. This may seem unnecessary, but it is no more care than the surgeon takes in every operative procedure.—*Items of Interest*.

Early Recognition of Cancer of the Mouth.—When the mouth is

open, the tongue and floor of the mouth should be inspected. Cancer of the tongue begins in the most insignificant local lesion, and then grows rapidly to a lesion which requires not only the most expert, but the most extensive surgical intervention. Recognized earlier, the treatment is not only less dangerous and not at all mutilating, but more certain of a permanent cure. The lesions on the mucous membrane of the mouth and tongue which should be specially looked for are white patches of leucoplakia in smokers, areas of irritation due often to ragged or encrusted teeth. Any change in the surface of the mucous membrane should be regarded as having potential possibilities as a focus of cancer.—J. G. BLOODGOOD, M.D., *The Journal of the N. D. A.*

Possibilities of Tungsten in Orthodontia Appliances.—We believe that with Tungsten, with its very high factor of strength and elasticity, the orthodontic appliances of the future will be modified to place more of the appliance out of sight, with slender arms attached, passing over the proximal contact points to their points of attachment, producing practically the same effect mechanically that is obtained at present, but with much more sightly appliances. Where the pins on the adaption arch require elasticity the small sizes of tungsten are particularly suitable.

The tungsten will prove particularly advantageous for anchorage retainers of all kinds, after orthodontic movement, for the following reasons. Its very large factor of strength makes it possible to use smaller sizes and therewith secure even greater rigidity. It does not crystallize and break like gold clasp bar, and similar metals, under the strain of mastication, which force produces a slight spring or bend continually. All orthodontists are familiar with this embarrassment.—W. A. PRICE and F. A. FAHRENWALD, *The Journal of the N. D. A.*

Conditions Demanding Removal of the Pulp.—(1) When decay has so progressed that all of the underlying dentin is decalcified, except in young subjects. (2) When prolonged pulpitis occurs beneath fillings of some years' standing. This seems especially true of gold. (3) When operative measures are necessary upon teeth either much abraded or much eroded. (4) When much dentin has to be removed in elongating or inclining teeth in preparation for shell gold crowns, especially metallic. (5) In treatment of advanced pyorrhea. (6) In facial neuralgia when associated with or superinduced by pulp degeneration.—R. W. BUNTING, *Dental Cosmos*.

Removal of Pulpless Temporary Teeth.—One of the important functions of the deciduous teeth concerns the normal occlusion of their successors, but if they are allowed to be destroyed by caries and become devitalized or necrotic, the question arises as to whether they are to be maintained at the probable risk of infection, in order to maintain or promote normal occlusion in the permanent teeth. The dentist is then called upon to decide which is the greater evil; infection, which is so frequent in such cases, with all its serious possibilities, or the possibility

of disturbed occlusion of the succeeding teeth and its consequences. From what I have seen of both conditions, I am persuaded strongly that the danger of infection is greater, and I feel it my duty to advise extraction, notwithstanding the frequent objection of the dentist or orthodontist.—W. J. ROE, *The Dental Cosmos*.

Treatment of the Antrum.—I am opposed to any method or operative treatment by which the maxillary sinus is made to drain through the nasal wall. I know this to be considered as good practice by laryngologists and nasal specialists, but I have witnessed many unpleasant and unfortunate results in cases where the nasal wall had been opened too extensively, so that the secretions of the nasal cavity had flowed into the maxillary sinus for months and years and had to be removed mechanically, the sinus becoming a receptacle for all kinds of secretions, pus, and debris which collects on the nasal mucuous membrane. Such practice I cannot but denounce. The proper and, to my mind, conservative treatment consists in opening the outer wall through the buccal cavity, curetting away entirely the diseased mucous membrane and tamponing the cavity with iodoform gauze. If this treatment is instituted, and the tampon is renewed every three or four days, new mucous membrane will reform in the course of three or four weeks, when the tamponing can be discontinued; in nine out of ten cases the opening will close spontaneously and recurrence of the trouble rarely occurs.—W. J. ROE, *The Dental Cosmos*.

Cleaning the Cervices of Teeth Before Applying the Rubber Dam.—The rubber dam should never be applied to a tooth before its cervix has been cleaned and disinfected. If this precaution is omitted, infectious material is forced by the rubber and the ligatures under the gum margin, where it may remain for hours. The interruption in the circulation of the blood favors infection of the weakened tissue. For disinfection, hydrogen dioxid followed by thymol-alcohol is recommended.—H. PICHLER, *The Dental Cosmos*.

Combination of Gold Inlay and Plastic Enamel in Anterior Teeth.—With the first introduction of the gold inlays attempts were made to produce an inlay which would have its conspicuous surface covered with porcelain. Many methods were tried, but none seemed so satisfactory as a method recently shown and now much utilized in the United States. This method even permits the use of a gold inlay in the anterior teeth. The procedure is to make a gold inlay of such form that all that part where strength is required shall be of gold. Such part as would be easily seen is cut away from the wax pattern and a box is formed, one edge of which shall be the margin of the tooth, the box, of course, only appearing as a box when the inlay is set. After setting the inlay this box is filled with a synthetic cement to match the tooth. Such combination inlays having been made, it was discovered that the beautiful transparency of the cement was lost by having the gold back of the filling; but in the

more recent inlays of this character this fault has been largely overcome by cutting windows completely through the gold. These windows afford a better hold for the cement, and, by permitting the passage of light, restore the translucency.—R. OTTOLENGUI, *The Dental Cosmos*.

Relation of Oral Lesions to Tuberculosis.—I would no more attempt to treat tuberculosis to-day without the aid of a dentist than without the assistance of good food and fresh air. A set of dirty teeth, even if there is no pyorrhea present, will undo or prevent all the gain the other methods will induce. On the other hand, when the teeth are in bad condition, and nutrition is manifestly interfered with, the observing dentist is in a position to warn the patient as to dangers threatened by numerous infections, tuberculosis included. Just how this disease is contracted is not definitely known. We are taught to believe that it is almost entirely an inhalation disease, yet such an able investigator as Doctor Thrash, of Atlanta, has attracted wide attention to his thesis, which seeks to show that it is primarily through the alimentary tract that the germs find their way. But whatever may be the avenue, the disease progresses or subsides according to the amount of bodily resistance which it meets. A foul mouth means lowered resistance. This is true, of course, of any infectious disease; but tuberculosis is the one scourge which is always with us, and constantly presents new problems for us to solve.—R. R. DALY, *The Dental Cosmos*.

Diagnosis of Necrosed Pulp.—Necrosis of the pulp is frequently met with. A pulp may be dead for months without causing any disturbance; it may be discovered on examining the teeth of a patient without the latter having any knowledge of its existence. The tooth under observation is often more or less discolored, heat or cold produces little or no reaction, and the translucence has usually become dulled. But the safest diagnostic aid is the electric current—a necrotic pulp does not respond to even the full current of the ordinary battery. The pathological types of pulp necrosis—viz., coagulation, colliquation, caseation, and mummification—play no part in the diagnosis proper.—H. PRINZ, *Dental Summary*.

Receptacle for Sterilizing Pulp Broaches, Burs, etc., by Formaldehyd.—The difficulties encountered in the sterilization by any of the wet methods of pulp broaches, burs, and similarly delicate dental instruments, are largely responsible for the omission of this essential precaution on the part of many practitioners. Sterility can be obtained if all debris is carefully brushed out from the bristles, grooves, or blades of such instruments, and these are preserved in a shallow tobacco jar with a hollow glass knob in the lid, which, when filled with a small wet sponge, serves as a humidor. In this hollow glass knob a few tablets of formaldehyd are inserted and held in place by a wad of dry cotton, the evaporating formaldehyd sterilizing the instruments if they are kept long enough under the action of the gas. Enough instruments should be kept in the

jar, of course, to allow of the employment of a freshly sterilized one for every case, as the gas must be allowed to act upon them for some time to produce the desired sterility. Even newly purchased broaches, burs, etc., should be subjected to such sterilization, as they are not sterile when removed from their packing. Vastly better results in root-canal treatments will amply repay the small trouble occasioned by this simple precaution.—R. H. REITHMULLER, *The Dental Cosmos*.

CURRENT NEWS

Items of professional news, of general interest, will be welcomed by the Associate Editor at 51 West Forty-seventh Street, New York City.

For several years the First District Dental Society of New York State has taken the lead in giving postgraduate instruction to those of its members who were wise enough to take advantage of the exceptional opportunities offered. Leading practitioners from all parts of the country have come to New York to appear before the various sections, and have given valuable instruction in their various specialties. The best informed dentists of the Society have benefited as much as the less distinguished members, until the Post-Graduate Sections are now an inseparable part of the work of the First District Society.

The plan was really begun by Dr. W. W. Walker several years ago, and he served as Supervisor, building up the scheme gradually until its worth was fully recognized and its success assured.

In 1914, when Dr. S. E. Davenport was elected to the presidency of the Society, Dr. Charles F. Ash was prevailed upon to accept the responsibilities shouldered by the Supervisor of Sections, Dr. Walker having retired, and he is willing to repeat in that capacity during another year. Dr. Ash did an enormous amount of routine work, showed himself to be a diplomat and possessed of unusual executive ability and finished the season of 1914-1915 in a blaze of glory, having guided the Sections through the best year in their history.

Such an attractive programme was provided for the courses that all were filled to overflowing and it was found necessary to deny many applicants admission, so great was the demand. Every Section had its own chairman and these gentlemen worked in conjunction with Dr. Ash, proving themselves able lieutenants.

Not only were the Sections successful in the numbers interested, in the quality of the papers read and practical instruction given, but the financial report made at the annual meeting was a distinct surprise to most of those present, as it showed that the small fees paid in by the men joining the Sections had been so well managed that a large profit had been made and turned into the treasury of the Society.

Altogether, the past year has been the banner one for the Sections and all those directly concerned in their management should be heartily congratulated.

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Small salaries do not allow the recipients to expend very much on the care of the teeth. Accordingly, for years the employees of the big and little firms who worked for small recompense have either been obliged to resort to the lure of the advertising dentist, with his "gold crowns

\$5.00," etc., or to pay no attention whatever to their teeth and mouths except when pain made it imperative.

This condition of affairs has, of course, been instrumental in causing poor health, with consequent inability to do the best work, and without a doubt it has shortened life in many cases. As we know, the Metropolitan Life Insurance Co. has recognized this situation and is doing its best to rectify it.

It is interesting to notice the change that has come rather lately in the appreciation of all phases of dental work by the employers. For example, some of the big department stores are making special arrangements of one sort or another for allowing the men and women working in them to receive dental attention at a fee within their means.

Lord & Taylor has taken the lead in this, there being a finely equipped office in the new store, with a competent dentist in charge. The employees are often given time during their working hours to receive dental attention, and they are encouraged in every way to keep their mouths in a healthy condition. The management of Lord & Taylor fixes the charges, pays for the materials, charges no office rent, provides all the equipment and the dentist receives the fee.

At Wanamaker's there is a dentist, but practically no time is allowed for anything except extraction and the relief of pain. This arrangement is naturally far inferior to that of Lord & Taylor, but infinitely better than nothing.

A third method of meeting the problem is illustrated in the case of Hearn's department store. In this instance, a large sum was paid to the College of Dental and Oral Surgery and a special contract drawn up, giving to all the employees of the firm the right of securing dental aid in return for the payment of an exceedingly small fee.

From these examples it may be readily seen that the near future will open ways and means for the small salaried employees to secure competent dental attention, and many of them will be quick to grasp the opportunity. The plan of charging a fee is the proper one for numberless reasons, not the least of these being that it keeps a person's self respect. This new condition of things then ought to prove quite a factor in the promotion of better health and longer life.

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Much has been published in the pages of THE JOURNAL regarding the Forsyth Dental Infirmary, Boston, Mass., its aim, etc., but now an entirely new departure has been made. There will be conducted at the Forsyth Infirmary, beginning in October, 1915, a Postgraduate School of Orthodontia. The calendar of the new course will be as follows:

October 4 to October 11, Entrance Examinations.

October 11 to November 23, Fall Term.

November 24 to November 29, Recess.

November 29 to December 21, Winter Term.

December 21 to January 3, Recess.

January 3 to May 22, Spring Term.

A dental degree from an accredited dental college will be absolutely essential for admission, and since the number of students will be limited to thirty, preference in selection will be given to men who have had a few years' experience in general practice, though all must pass the entrance examinations to be eligible. The tuition fee will be \$350, and all books and records covering the office practice of the older applicants must be presented for inspection, as no one will be accepted who is turning to Orthodontia after making a failure of dentistry.

The reason for the course is to form what will really amount to a School in Preventive Orthodontia, as particular attention will be paid to the process of normal development from infancy to adult life, noting the changes instituted by nature at the various ages, and instruction will be given in all subjects bearing upon the fundamental conditions necessitating orthodontic treatment.

It is felt that with the high standards required at the present time, a postgraduate course of this character will be of great advantage to many practitioners, but particularly to the children, for whom the Forsyth Infirmary was founded.

A certificate will be awarded to every man who completes the course and passes the examinations with credit. In addition, a certificate from the Forsyth Infirmary will be granted to all graduates.

* * * * *

The Metropolitan Life Insurance Company of New York has established a Dental Clinic in its Home Office, 1 Madison Avenue, New York City. Prophylactic treatment and examination will be given to those employees who wish to take advantage of this offer.

Some 2,600 have already expressed their intention of availing themselves of this opportunity. To meet this demand five chairs are being installed, with five operators and four assistants. Charts have been designed for recording conditions found, and provision made for recording, when necessary, the previous health record which can be copied from the *Medical Record*.

There is also space provided for the results of radiographic, bacteriological, and saliva tests.

Those cases that are found to need operative dental work will be provided with a slip showing the teeth requiring attention, and be referred to their own dentist for this work, with the request to report back to the Dental Clinic as soon as the work is completed. In this way it is hoped to keep the employee in good dental condition, as prophylactic treatment and examination will be made twice a year.

It is expected that valuable data will be secured, showing an improvement in the health and efficiency of those who receive this dental attention.

LEGAL NEWS

[The following Bill, relative to the Practice of Dentistry in the State of Massachusetts, has received the Governor's signature.]

SENATE

No. 228

To accompany the petition of the Massachusetts Dental Society and another relative to the practice of dentistry. Public Health.

The Commonwealth of Massachusetts

In the Year One Thousand Nine Hundred and Fifteen.

AN ACT

Relative to the Practice of Dentistry.

Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, as follows:

1 SECTION I. There shall be a board of dental examiners
2 consisting of five persons, each of whom shall be a legal
3 resident of this commonwealth, a reputable dentist and a
4 graduate of a reputable dental college, with an actual
5 practice in dentistry in this commonwealth for the ten
6 years next preceding his appointment. Said board shall
7 examine candidates for registration in dentistry. The
8 present members of the board of registration in dentistry
9 shall constitute this board and shall serve out the re-
10 spective terms for which they have been appointed. No
11 member of the board shall be a member of the faculty
12 or a trustee of any institution engaged in educating den-
13 tists or having power to grant degrees in dentistry.

14 The governor, with the advice and consent of the coun-
15 cil, shall appoint the members of said board in the follow-
16 ing manner:—In April in the year nineteen hundred
17 and fifteen, one member for three years and one for four
18 years; in April in the year nineteen hundred and sixteen,
19 one member for four years and one for five years, and
20 annually in April thereafter one member for a term of five
21 years. No member shall serve more than two full terms.
22 Vacancies in the board shall be filled for the unexpired

23 term by the governor, with the advice and consent of the
24 council.

25 The governor, with the advice and consent of the coun-
26 cil, shall have power to remove from office any member of
27 said board for continual neglect of duty required by
28 this act.

29 Said board shall have full power to make and shall
30 publish necessary rules and regulations for the proper
31 conduct of its duties under this act. It shall annually
32 choose one of its members chairman and one secretary
33 and shall hold at least two regular meetings each year
34 in Boston. Four members of the board shall constitute
35 a quorum for the transaction of business. Said board
36 shall keep a full record of its proceedings and a full
37 registry of all persons certified as dentists by it, which
38 shall be public records and open to inspection.

39 A transcript of any of the entries in such record, certi-
40 fied by the secretary, shall be competent evidence of the
41 facts therein stated. On or before the first day of Jan-
42 uary in each year said board shall render to the governor
43 a full and accurate account of its proceedings, receipts
44 and disbursements during the year immediately preceding.

45 The chairman and secretary of the board of dental
46 examiners shall each receive a salary of four hundred
47 dollars a year, and the other members of said board shall
48 each receive a salary of three hundred dollars a year.

49 Each member of the board shall receive in addition to
50 his regular salary his necessary travelling expenses ac-
51 tually incurred in attending meetings of the board after
52 he shall have filed an itemized account of said expenses
53 with the auditor of the commonwealth. Said salaries and
54 expenses shall be paid out of the treasury of the common-
55 wealth. The board shall keep a record of all moneys re-
56 ceived and expenses incurred by it and a duplicate thereof
57 shall be open to inspection in the office of the auditor of
58 the commonwealth.

59 The fees received for examination before the board
60 shall be paid forthwith by the secretary of the board into
61 the treasury of the commonwealth.

62 The board shall publish every three years complete
63 lists of the names and office addresses of all dentists
64 registered and practicing in the state, arranged alpha-
65 betically by name and also by cities and town in which
66 their offices are located.

67 The board shall have the power to call for and require

68 a registration whenever it deems it necessary or expedient
69 to secure accurate lists of the registered dentists practicing
70 in this commonwealth, with their office addresses.
71 Each dentist when he commences practice, either by himself
72 or as an assistant, shall forthwith notify the board
73 of his office address. Each registered dentist shall exhibit
74 his full name in plain readable letters in each office or
75 room in which such business is transacted. Any dentist
76 failing to comply with the requirements of this section
77 may be punished by a fine not exceeding fifty dollars.

1 SECTION 2. Any person twenty-one years of age or over
2 and of good moral character, who is a graduate of an
3 accredited high school or presents proof of equivalent
4 training and has received a diploma from the faculty of
5 a reputable dental college as defined in this act, shall,
6 upon fulfilment of requirements for applicants as herein-
7 after specified, be entitled to examination by the board
8 of dental examiners: *provided*, that a person who has spent
9 three years in a reputable dental college as herein defined
10 and has successfully passed all examinations of the first
11 and second years, but has not received a degree, may at
12 the discretion of the board be examined. If found competent
13 said applicant shall be registered by said board and
14 shall receive a certificate of registration signed by the
15 members of the board, which shall be *prima facie* evidence
16 of the right of the holder to practice dentistry
17 in this commonwealth. In proof of this right this certificate
18 or a duplicate shall be kept in his office in plain
19 view of his patients and shall be shown to any member
20 or agent of the board on application.

33 Each person entitled to examination shall make an
34 application in writing and present proof of his graduation
35 from a reputable dental college and pay a fee of twenty
36 dollars, which shall not be returned to him. An applicant
37 who fails in his examination shall be entitled to one
38 re-examination free of charge, but for each subsequent
39 examination he shall pay ten dollars.

40 The examination may be written or oral or both, at
41 the option of the board, and shall include the principal
42 subjects taught in reputable dental colleges. Demonstrations
43 in operative and prosthetic dentistry, diagnosis and
44 prognosis shall be required.

45 Said board in its discretion may, without examination,
46 upon the payment of a fee of twenty dollars, register and

47 issue a certificate to a dentist who has been lawfully in
48 practice for at least five years in another state, territory
49 or in the District of Columbia, or to any dentist regis-
50 tered in another state, territory or the District of Co-
51 lumbia: *provided*, that said state, territory or District
52 of Columbia maintain a law containing requirements
53 equivalent to those of this act, under which he has been
54 registered, and: *provided*, that each applicant presents
55 a certificate from the board of dental examiners or other
56 board where he last practiced.

57 Said board may issue duplicate certificates of registra-
58 tion, the fee for which shall be five dollars each.

1 SECTION 3. No person not a registered dentist shall
2 directly or indirectly practice dentistry in the common-
3 wealth of Massachusetts, except as provided in this act,
4 but the widow, executor or administrator of a registered
5 dentist who has died, or the wife of one who has been
6 incapacitated, may continue his business under a regis-
7 tered dentist.

8 It shall be unlawful for any person or persons to oper-
9 ate any dental office under any name other than the name
10 of the dentist or dentists actually owning the practice, or
11 a corporation name containing the name of said dentist
12 or dentists.

13 Any person who owns or carries on a dental practice
14 or business, or who by himself, by his servants or agents,
15 or by contract with others, shall perform any operation
16 on or make examination of, with the intent of performing
17 or causing to be performed, any operation on the human
18 teeth or jaws, or who shall describe himself by the
19 words or letters "dentist," "D. D. S.," or other words,
20 letters or title in connection with his name, or who shall
21 advertise by sign, card, circular, pamphlet or newspaper,
22 or otherwise indicate that he by contract with others, or
23 by himself, his servants or agents, will perform any oper-
24 ation on or make examination of, with the intention of
25 performing or causing to be performed any operation on
26 the human teeth or jaws, shall be deemed to be practicing
27 dentistry within the meaning of this act, and unless duly
28 authorized thereto by obtaining a certificate as provided in
29 this act shall be liable to punishment as herein provided,
30 and whoever in practicing dentistry as above defined owns
31 and carries on a dental practice or business, and in said
32 business employs or permits any other person to practice

dentistry as above defined, unless such other person is duly certified and exhibits his name and certificate as herein provided, or who fails to exhibit his name as required by this act, shall for each offence be liable to punishment as herein provided. The word "person" in this act shall include a corporation; and any corporation violating any provision of this act shall be liable to a fine as herein provided, and the officers of the corporation concerned in the said violation shall be liable to fine and imprisonment as herein provided.

Any person of good moral character and twenty years of age may upon the payment of ten dollars, which shall not be returned to him, be examined by said board in the subjects considered essential by it for a dental-hygienist, and, if his examination is satisfactory, shall be registered as a dental-hygienist and given a certificate allowing him to clean teeth under the direction of a registered dentist of his commonwealth, in public or private schools or institutions approved by the local board of health.

Nothing in this act shall apply to treatment by a registered physician not practicing dentistry as a specialty, in cases where he deems immediate treatment necessary for the relief of his patients, nor prevent a registered dentist of another state or his assistant from operating at a public clinic under the auspices of a duly organized and reputable dental college or association, nor prevent a student of a reputable dental college, incorporated under the laws of this commonwealth and granting degrees in dentistry, from performing operations as part of the regular college course.

A registered dentist shall have the same right to prescribe or buy drugs or medicine for use in the conduct of his practice as a registered physician of this commonwealth.

SECTION 4. Whoever falsely claims to have a certificate granted by said board, or who, having such certificate, fails to exhibit the same as required by this act, or who falsely and with intent to deceive claims to be a graduate of any college granting degrees in dentistry, or who practices or attempts to practice dentistry without being registered as herein provided, or any registered dentist or any owners or managers of an incorporated dental company who shall employ an unregistered person as an operator, may be punished for each offence by a fine of

11 not more than two hundred dollars or by imprisonment
12 for three months or by both fine and imprisonment.

1 SECTION 5. Sections twenty-four to twenty-nine, in-
2 clusive, of chapter seventy-six of the Revised Laws and
3 amendments thereof and all other acts and parts of acts
4 inconsistent with the provisions of this act are hereby
5 repealed.

6 The provisions of this act, so far as they are the same
7 as those of existing laws, shall be construed as a continua-
8 tion of such laws, and not as new enactments, and the
9 repeal by this act of any provision of law shall not revive
10 any law heretofore repealed or superseded, nor shall it
11 affect any act done, liability incurred or any right accrued
12 or established, or any suit or prosecution, civil or criminal,
13 pending or to be instituted to enforce any right or penalty
14 or to punish any offence under the authority of the re-
15 pealed laws.

1 SECTION 6. This act shall take effect upon its passage,
2 except that the educational requirements for candidates
3 shall take effect one year from date of passage.

BOOK REVIEWS

By C. FRANKLIN MACDONALD, D.M.D.

MANUAL OF DENTAL ANATOMY, HUMAN AND COMPARATIVE. By Charles S. Tomes, LL.D., F.R.S., F.R.C.S. Seventh edition, edited by H. W. Maretts Tims and A. Hopewell-Smith. Cloth, \$4.50 net. P. Blakiston's Son & Co., publishers, Philadelphia.

This "Manual of Dental Anatomy," by C. S. Tomes, is so universally known and appreciated that hardly any comment seems necessary except to welcome this new edition, the seventh.

The present edition has as joint editors H. W. Maretts Tims and A. Hopewell-Smith, men of such abilities that their collaboration in a work of this nature should lend the final stamp of authority, if one be necessary.

All of the most recent and valuable research along the lines of anatomy and evolution have been incorporated in this volume, so that it is a work giving the latest and most generally accepted theories of the present time.

Divided into two sections, the first takes up primarily the anatomy of the human teeth. In the description of the teeth the editors make a change in the use of the terms "mesial" and "distal," using the term "proximal" for the old "distal" and "distal" in place of "mesial," selecting the articular ends of the jaw as a reference point rather than the usual median line of the mouth. They claim it may be "more in accordance with anatomical usage," but it is rather confusing. The chemistry and histology of the enamel and different varieties of dentin are taken up in some detail. As to organic matter in enamel, the conclusion is reached by experiments of the author that "there is no organic matter at all (in any noteworthy amount) in enamel, and that that which has heretofore been set down as organic matter . . . is simply water combined with the lime salts." Development of the teeth, with their eruptions and attachments, the gum, pulp, alveolo-dental membrane, and the processes of calcification of enamel, dentin, and cementum, are considered in this section in the light of the most recent knowledge.

The second section deals entirely with comparative anatomy and the present prevailing theories of evolution. Commencing with the teeth of the fishes, all the various classes of this general order are briefly described, followed by those of the reptiles and mammals. The section closes with an interesting account of the recent discoveries of the remains of prehistoric man, in which the teeth and jaws play a most important part.

References are given for the literature of the subject matter of each chapter at its end and this portion is most complete.

This manual can certainly be said to be a most elaborate and com-

plete treatise upon dental anatomy. With the present state of dental education in this country, however, much of this book will be almost beyond the understanding of the average dentist, or even student. To fully appreciate much of its contents a preliminary knowledge of general biology is necessary; and unfortunately this is not now included as a requisite for the dental student.

For one particularly interested in dental anatomy and as a book for reference it is most valuable, and it is to be hoped that dental education will speedily be brought to the heights which it attains.

DENTAL STATE BOARD QUESTIONS AND ANSWERS. By R. Max Goepp, M.D., author of Medical State Board Questions and Answers. Octavo volume of 428 pages. Philadelphia and London: W. B. Saunders Company, 1912. Cloth. \$2.75 net.

The approach of June and July, with the usual boggy of the State Board Examinations, will naturally turn certain minds toward ways and means for successfully passing these ordeals.

Doctor Goepp has attempted to render assistance along this line by the present book of "Dental State Board Questions and Answers." The questions are held to be representative of the kind usually asked by examiners in all States of the Union. On the whole, the selection seems to cover a wide range of important questions, and the answers, in general, are rather satisfactory.

The contents of the volume begins with physics, and includes chemistry, anatomy, physiology, pathology, bacteriology, materia medica, hygiene, surgery, orthodontia, and operative and prosthetic dentistry.

In a hasty perusal of the answers, it seems that it might be advisable before another edition is put forth that it be carefully revised, especially in regard to certain contradictory statements. For instance, the peridental membrane is described as an "elastic tissue investment," yet later a statement is made, which is correct, that this membrane is a "connective tissue *free* from elastic fibres." Again the pulp is said to consist of "a system of arteries, veins, *lymphatics*," etc.; but in a question, "Are lymphatics found in the teeth?" it is plainly stated that they are not. Under the points of distinction between the upper first and second bicuspid, it is said that "usually the first bicuspid has only one flattened canal and the second bicuspid two distinct canals," which, although canals in teeth are very variable, is contrary to the usual condition.

The statement that saliva contains "ferric phosphate" must almost be credited to a misprint; and it may interest manufacturers of dental cements to know that the difference between oxychlorid and oxyphosphate cements is that in the powder "the oxyphosphate contains more oxid of zinc and *ground glass*."

It appears at times as if the author, in the search for concise answers, has rather curtailed the necessary full explanations, and some answers may not come up to the expectations of many. For instance, in

the filling of root canals, mention only is made of the use of oxychlorid of zinc with or without gutta percha points, while many expert operators prefer, and many schools teach, the use of chlora or eucha percha solutions and points. In the reduction of a dislocation of the inferior maxillary bone, the surgeon is instructed to stand *behind* the patient, which seems a decidedly awkward procedure as compared to the usual instruction to stand in *front* of the patient.

It is a rather disputed question among educators as to the real value of these quiz compends, etc. For those who have received a thorough grounding in dental or medical subjects, and have absorbed by study not only their principles but some of their details, a book of this kind may prove of considerable help. It does point out the more important questions of general value, and assists one in the manner of constructing and the necessity for concise but comprehensive answers.

The recommendation of the author, in his preface, that the book is designed "also for the use of dental students in their undergraduate work" can hardly be approved; since it will tend to direct the lazy and careless student—and there are many of them—only toward a preparation to pass the dental state boards. This would prove a serious detriment to his general education, which is so essential.

Books of this nature possibly hold a rather unfortunate position; but for one who is preparing for State Board Examinations, and has received a good preliminary training, this volume can be urged as valuable in pointing the way. With a careful revision this book can also fill the place in the library of any general practitioner as a "ready reference handbook," since the index seems very complete.

PRINCIPLES AND PRACTICE OF TOOTH EXTRACTION AND LOCAL ANESTHESIA OF THE MAXILLÆ. By William J. Lederer, D.D.S., dental consultant German Hospital, New York City. 12mo., 260 pages, with 120 textual figures and 4 plates. Price, \$3.00. Publishers, Rebman Co., New York, 1915.

The extraction of teeth and the production of local anesthesia is now rapidly being recognized as a strictly surgical procedure to be carried out with all the care and cleanliness which other surgical operations demand. Dr. Lederer throughout this compact treatise emphasizes and presents as his main thought that dentists "must accept and apply the principles of general surgery."

Divided into two parts, the first deals with the extraction of teeth, and the second with the production of local anesthesia. The usual preliminary considerations of sterilization, examination of patients, indications for extractions, etc., are gone over in a brief manner.

The author says, "The fewer forceps an operator gets along with the better," and presents a quite complete armamentarium for ordinary usage. He advocates as preferable, that all extraction be done while standing in front of patient, with possible exception of the lower left side, when he stands to right side and parallel with patient.

In the extraction of broken down roots and impacted teeth the writer strongly urges incisions through the overlying gum as a preliminary to extraction, or the making of flaps and dissection of tissue, placing in italics the following: "*To cut soft tissues with the forceps is brutal, unscientific, unsurgical, unnecessary and harmful to the patient, for it is not cutting but tearing tissue.*"

Some of his final advices are: "Do not hurry;" "never attempt to operate in the dark; do not feel your way along; see what you are doing," and "it is better to cut a little more tissue away and proceed than to do damage." Post operative treatments and handling of complications are considered in a concise but competent manner.

General anesthesia is not taken up in this book, the methods for producing local anesthesia receiving the entire consideration, since the author believes that with few exceptions the method of local anesthesia is the one of choice. The usual routine procedures for injections as laid down by Prof. Fischer are presented in a brief way with illustrative plates. The keys to conductive anesthesia for extractions might be more easily followed if arranged in tables.

The volume closes with a few pages containing some useful prescriptions, antidotes for poisons and emergencies liable to be encountered in the dental office and a glossary. This latter, the glossary, seems superfluous and unnecessary for the great part, since it is to be hoped that those who read this book will have, at least, a faint knowledge of what is meant by abscess, alveolar process, etc., and the meaning of such common English words as acute, pallor, tooth, etc.

The illustrations are, many of them, good, and the book is printed on good paper, but it seems as though the price of \$3 is rather high considering the size and contents of this volume as compared to other works dealing with these subjects.

This book by Dr. Lederer is quite excellent as a brief treatise upon tooth extraction and local anesthesia and the principles which he lays down make for the highest in dental surgery.

A MANUAL OF NORMAL HISTOLOGY AND ORGANOGRAPHY. Third Edition, thoroughly revised. By Charles Hill, Ph.D., M.D., Professor of Histology and Embryology, Chicago Veterinary College, formerly Assistant Professor of Histology and Embryology, Northwestern University Medical School, Chicago. Third edition, thoroughly revised. 12mo. of 483 pages, with 312 illustrations. Philadelphia and London: W. B. Saunders Company, 1914. Cloth, \$2.25 net.

This book by Dr. Charles Hill is a concise and condensed presentation of normal histology, giving the principle facts in a clear manner and eliminating all but the most essential of the theoretical matter.

The introductory chapter takes up the preparation of material and the succeeding chapters consider the various tissues and organs somewhat in their microscopical appearances, but chiefly from the normal microscopical view. The concluding chapter gives a brief idea of fixing and staining solutions.

Unlike many books of general histology, this volume contains a rather extended account of the tissues of the mouth and teeth, being derived in most part, as the author states, from the work of Prof. F. B. Noyes.

In connection with the study of each tissue, under general considerations, a short explanation is given of the common pathological manifestations in them, as felon, an infection beneath the periosteum; osteomyelitis; melanotic sarcoma, etc. While strictly unnecessary in the study of normal tissue these short references to the abnormal tend to lend added interest to the subject matter.

This volume is well fitted to serve the purpose of a general guide to the study of histology. Its use by students, however, will necessitate a competent course of instructions in conjunction with it, to go more into the important details which this book but slightly touches upon. It should be valuable and seems especially adapted for, as the author suggests, "a basis on which the instructor may build and complete his ideal elementary course in histology."

OBITUARY

"IN MEMORIAM" RESOLUTIONS ADOPTED BY THE AMERICAN ACADEMY OF DENTAL SCIENCE.

JAMES TRUMAN.

Professor James Truman, one of the most distinguished of the Associate members of the American Academy of Dental Science, died at his home in Philadelphia, November 26, 1914, in the eighty-eighth year of his life. The loss of Professor Truman will be deeply mourned wherever dentistry is practised. He was one of the founders of his profession, and one of the best exponents of its larger possibilities. He was also one of our foremost teachers, and the students who sat under his instruction revered him as they would a father. All who came in contact with Dr. Truman realized the exalted nature of the man and his nobility of character, his love of mankind and his charity for all. His was a fully rounded life, beginning early with large promise, equalling every anticipation in its maturity, fertile, and beautiful to its close in the ripeness of its well-filled years.

Dr. Truman began the study of dentistry with his father, who was both a dentist and a physician. He graduated at the Philadelphia College of Dental Surgery in 1854. In 1864 he accepted the position offered him as demonstrator-in-chief of operative dentistry in the college from which he graduated. In 1865 Dr. Truman was elected to fill the chair of Dental Physiology, and Operative Dentistry in the Pennsylvania Dental College, and he held that position until 1870, when he resigned. He was the editor of the *Dental Times* during this professorship, and during the four years of its existence the productions of his pen were published in this journal. On account of his health, he went to Germany and settled at first in Frankfort, practising there a year. He then went to Hanover, and had among his patients many of the nobility and the wealthy residents of that province. In 1880 he returned to America and began practice in Philadelphia again. In 1882 he was elected Professor of Dental Pathology, Therapeutics, and Materia Medica in the Department of Dentistry of the University of Pennsylvania. In 1883 he was made secretary, and subsequently dean, which position he held until he retired in 1896. In 1890 he was appointed editor of the *International Dental Journal*, and he held that position until the publication ceased in 1905. He received the degree L.L.D. from the University of Pennsylvania in 1904. Professor Truman was one of the pioneers of organized professional dentistry, and brought to the solution of this problem a commanding personality, a vigorous, and at times an aggressive intellectuality, a masterful command of language, and a dignity and forcefulness of mind which inevitably carried conviction to his hearers. We feel that no tribute to his memory can be too generous or too universal.

Therefore be it Resolved, That in the death of Professor Truman the American Academy of Dental Science loses one of its most distinguished fellows, who has been a signal honor to his profession, whose life was full of simplicity, tenderness, and personal charm, whose advanced years were as beautiful as his manhood and his youth; a man who was loved wherever known.

R. R. ANDREWS,
EDWARD C. BRIGGS,
T. O. LOVELAND,

Committee.

LOUIS JACK.

Dr. Louis Jack, a distinguished associate fellow of the American Academy of Dental Science, died at his home at Moyland, Pa., near Philadelphia, on December 9, 1914, in his eighty-third year. He was born at Germantown, a suburb of Philadelphia, March 26, 1832, and enjoyed a practice of fifty-four unbroken years in his chosen profession.

At an early age he was taken by his parents to Beaver County, Pa., where he received his preliminary education at the Bridgewater Academy. At the age of twenty he returned to Philadelphia, and soon decided to take up the study of dentistry. He first became associated with Dr. William R. White, in whose laboratory he was employed, and afterward with Dr. C. C. Williams. It was at this time that he learned that the Philadelphia College of Dental Surgery, the first school in Pennsylvania to teach dentistry, was about to open its doors to students, and he was the first matriculate to register (September 2, 1852). He graduated in a class of nineteen on February 28, 1854.

Soon after graduating, he opened his first office in the house of Dr. Robert Arthur, and was closely associated with him. It was during the winter of 1855 that the cohesive property of gold foil was first brought to light in Dr. Arthur's laboratory.

He was instructor at the college for several years after his graduation, and in 1857 moved his office to Germantown, within a stone's throw of the spot where he was born, and in 1864 he returned to the city proper, where he remained until his retirement in 1908.

For several years during the early seventies, he devoted much of his time after hours to the construction of an electric mallet. This invention he gave to the dental profession, and for this act the Odontographic Society of Pennsylvania presented to him a testimonial of thanks for his "Professional Liberality and Loyalty to Professional Ethics."

He early recognized the importance of a good and lasting school for the teaching of dentistry in this country, was of the first to urge the institution of such a department at the University of Pennsylvania, and was instrumental in the formation of that department in 1877, and in which he was an occasional lecturer.

He was the "Father member" of the Philadelphia Dental Club, having been a member covering a period of forty-two years, from its origin in 1872 until the time of his death.

He was interested in the development of the *International Dental Journal*, and was for a time president of the corporation which owned and published it. He was a member of the National Dental Association, the American Academy of Dental Science, the Odontographic Society of Pennsylvania, the Odontological Society of Pennsylvania, the Pennsylvania State Dental Society, the Academy of Stomatology, and the Philadelphia Dental Club.

Dr. Jack was the last survivor of the class of 1854 of the old Philadelphia College of Dental Surgery. He was a classmate of Prof. James Truman, who died in Philadelphia only a month before.

Dr. Jack was a man of unusual ability, a gentleman of the highest character, dignified and refined. He was a sturdy advocate of all that was best in his profession. The hand of an artist showed itself unmistakably in everything he did. His skill as an operator gave to him an international reputation. The Academy honors the memory of Dr. Louis Jack, and sorrowfully adds one more illustrious name to its memorial records.

He did much to make our profession what it is to-day, one of the great ameliorating agencies of modern civilization.

He was not untimely taken. His life, prolonged many years, was happy and famous.

We look upon his distinguished attainments with feelings of gratitude and appreciation. No man ever exercised a more genial personal influence over his friends, and those who knew him best realized the exalted character of the man, and loved him.

Therefore be it Resolved, That in the death of Dr. Louis Jack the Academy mourns one of its distinguished fellows, who has ever been an honor to his profession, and we deem it fitting to make a record of our sense of sorrow at his loss.

ROBERT R. ANDREWS,
CHARLES A. BRACKETT,
EUGENE H. SMITH,

Committee.

KIRK ADDISON DAVENPORT

The death of Kirk Addison Davenport, D.D.S., D.M.D., M.D.S., occurred at his residence in London, England, on March 13, 1915. Dr. Davenport was the youngest of the brothers, Isaac B., William S. and Kirk, all of whom have represented American dentistry abroad for many years with credit and honor. He was a son of the late Rev. and Mrs. William W. Davenport, of Union, N. Y., a graduate of the Dental Departments of the University of Pennsylvania and of Harvard University and had also obtained the degree of M.D.S. from the New York State Board.

After graduation he went to Dresden, Germany, where he was associated with Dr. N. S. Jenkins. Later he went to London and established himself at 20 Stratford Place, where he was very successful in the practice of his profession. He was born in 1869 and was a cousin of Dr. S. E. Davenport, of New York, and others of this family which has furnished so many men to the dental profession. In August, 1900, he married Miss Lou Mercereau, of Union, N. Y., who survives him with two children, a son and a daughter. In his death the profession has lost one of the ablest of its representatives in England. He was past president of the American Dental Society of Europe, a member of the British Dental Association and a member of the First District Dental Society of the State of New York. He loved his profession, his ideals were high and his beneficial influence upon dentists and dentistry will long be recognized.

NOTICES

THE PANAMA PACIFIC DENTAL CONGRESS IS TO BE
HELD AT SAN FRANCISCO, CALIFORNIA, IN THE
EXPOSITION AUDITORIUM, AUGUST 30th
TO SEPTEMBER 9th, 1915

The members of the Transportation Committee of the National Dental Association adopted three official railway routes and schedules to San Francisco from the East, and are now engaged in calling the attention of the profession to the schedules planned. Members of the committee are located in different sections of the States, and are prepared to give members of the profession in their localities general information regarding the railway routes, fares, etc.

The railway trains scheduled as arranged by the committee going to San Francisco have special equipment and train service. The routes are popular, the trains are of the most comfortable cars; the arrangements being complete, insures pleasant associations and encourages good fellowship.

The railway itinerary of the official trains as published in the March number of *THE JOURNAL OF THE ALLIED DENTAL SOCIETIES*, page 119, should be examined carefully by all that are intending to make the trip, as the plan adopted in employing our special and official trains is to encourage comfort in transit and general good fellowship. The committee suggests that one should confer with their local railway agent, or one referred to in our itineraries, and choose a route for their return trip, which is necessary before purchasing a reduced fare ticket.

The committee request that editors of all dental journals, officers of State and local dental societies and all members of the profession do what they can to interest members of the profession in joining us in our trip to attend the Congress and in that manner add to the attendance and assure the success of the Congress.

TRANSPORTATION COMMITTEE NATIONAL DENTAL ASSOCIATION

Dr. Victor H. Jackson (chairman), 40 East Forty-first Street, New York.

Dr. H. F. Hoffman, 324 Metropolitan Building, Denver, Colo.

Dr. Jós. D. Eby, 509 Fourth National Bank Building, Atlanta, Ga.

Dr. D. C. Bacon, Columbus Memorial Building, Chicago, Ill.

Dr. Henry W. Weirick, 503 Mechanics Building, San Francisco, Cal.

Dr. J. P. Marshall, 7401 Hazel Avenue, St. Louis, Mo.

THE OFFICIAL TRAIN SCHEDULE TO THE PANAMA-PACIFIC DENTAL CONGRESS, SAN FRANCISCO, CAL., AUGUST 30, SEPT. 9, 1915

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Dr. E. M. Carson, 1115 Union Building, Seattle, Wash.

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Dr. J. D. Eby, 519 Grant Building, Atlanta, Ga.

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Dr. F. W. Gethro, 122 South Michigan Avenue, Chicago, Ill.

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Dr. Geo. T. Williams, Cobb Building, Seattle, Wash.

Dr. Geo. F. Stiehl, Judge Building, Salt Lake City, Utah.

Dr. H. H. Wilson, Phœnix, Ariz.

Dr. Albert A. Jessup, Boise, Idaho.

THE CONGRESS.

The Panama-Pacific Dental Congress was organized by the dentists of a half a dozen Western States for the purpose of bringing together representatives of the dental profession from all over the world for their mutual benefit, to renew old acquaintances, form new friendships, to pro-

mote their many interests, and to accomplish all those purposes on a basis of good fellowship among the men and women of the profession. At the time of the holding of this ten days' Congress, the annual meetings of "The Federation Dentaire International," "The American Society of Orthodontists," "California State Dental Association," "Southern California State Dental Society," "Salt Lake County Dental Society," "Delta Sigma Delta," "Psi Omega," and "Xi Psi Phi" dental fraternities, and other meetings will take place.

About one hundred papers will be read by leading men on topics new and old, but up to date. There will be eight days' clinics—both chair and table—practical demonstrations in everything modern in dentistry by prominent operators in the profession. Thirty-five thousand square feet of floor space of the main auditorium will be devoted to Manufacturers' and Dealers' Exhibits, displaying and demonstrating every appliance and material devoted to modern dentistry. A complete exhibit of everything that pertains to oral and school hygiene and sanitation will be given a prominent place. All will be held in San Francisco's New Auditorium, five minutes' ride from the hotel and business sections of the city.

Every progressive dentist should accept this invitation to the Greatest Dental Congress ever held—an invitation extended by the dentists of this section to the profession of the world.

THE TOUR.

The Transportation Committee of the Panama-Pacific Dental Congress has endeavored to furnish schedule of train service, which will afford the greatest amount of comfort, sightseeing and pleasure, with the least amount of fatigue and inconvenience at a minimum of expense, for all those coming from Eastern points. In order to meet the desires of the dentists, their families and friends wishing to attend this Congress, we have deemed it best to adopt the following schedules:

Leave Boston 12.00 Midnight, August 22, via N. Y., N. H. & H. R. R.
Arrive New York 7.00 a. m., August 23, via N. Y., N. H. & H. R. R.

Change from Grand Central to the Pennsylvania Station.

Leave New York 2.04 p. m., August 23, via Pennsylvania R. R.
Leave Newark 2.27 p. m., August 23, via Pennsylvania R. R.
Leave Philadelphia 4.31 p. m., August 23, via Pennsylvania R. R.
Leave Harrisburg 7.25 p. m., August 23, via Pennsylvania R. R.
Leave Altoona 11.00 p. m., August 23, via Pennsylvania R. R.
Leave Pittsburgh 1.35 a. m., C. T., August 24, via Pennsylvania R. R.
Leave Columbus 7.00 a. m., August 24, via Pennsylvania R. R.
Leave Logansport 1.15 p. m., August 24, via Pennsylvania R. R.
Arrive Chicago 5.00 p. m., August 24, via Pennsylvania R. R.

Train to be switched to Chicago & Northwestern Station. A few hours for sightseeing and recreation in Chicago.

Leave Chicago 10.45 p. m., August 24, via Chicago & Northwestern.
Leave Cedar Rapids 6.00 a. m., August 25, via Chicago & Northwestern.
Leave Marshalltown 8.18 a. m., August 25, via Chicago & Northwestern.

Leave Ames 9.50 a. m., August 25, via Chicago & Northwestern.
 Arrive Omaha 3.45 p. m., August 25, via Chicago & Northwestern.
 Leave Omaha 4.20 p. m., August 25, via Union Pacific Railway.
 Leave Grand Island 8.20 p. m., August 25, via Union Pacific Railway.
 Arrive Denver 7.30 a. m., August 26, via Union Pacific Railway.
 Leave Denver 7.45 a. m., August 26, via Denver & Rio Grande.
 Arrive Colorado Springs 10.30 a. m., August 26, via Denver & Rio Grande.

Spend day and night here for sightseeing.

Leave Colorado Springs 10.55 a. m., August 27, via Denver & Rio Grande.
 Leave Royal Gorge 1.50 p. m., August 27, via Denver & Rio Grande.
 Leave Glenwood Springs 10.10 p. m., August 27, via Denver & Rio Grande.
 Arrive Salt Lake City 12.01 Noon, August 28, via Denver & Rio Grande.
 Leave Salt Lake City 1.45 p. m., August 28, via Western Pacific Railway.
 Leave Feather River Canyon 7.00 a. m., August 29, via Western Pacific
 Railway.

Arrive San Francisco 5.45 p. m., August 29, via Western Pacific Railway.

PASSENGERS FROM FOLLOWING POINTS SHOULD LEAVE AS FOLLOWS TO JOIN
 SPECIAL TRAIN.

Leave Washington 3.10 p. m., August 23, via Pennsylvania Railway.
 Leave Baltimore 4.20 p. m., August 23, via Pennsylvania Railway.
 Arrive Harrisburg 6.40 p. m., August 23, via Pennsylvania Railway.
 Leave Louisville 8.20 a. m., August 24, via Pennsylvania Railway.
 Leave Indianapolis 11.40 a. m., August 24, via Pennsylvania Railway.
 Arrive Chicago 5.40 p. m., August 24, via Pennsylvania Railway.
 Leave Dayton 9.05 a. m., August 24, via Pennsylvania Railway.
 Arrive Chicago 5.40 p. m., August 24, via Pennsylvania Railway.
 Leave Cleveland 7.20 a. m., August 24, via Lake Shore Railway.
 Leave Toledo 10.05 a. m., August 24, via Lake Shore Railway.
 Arrive Chicago 4.00 p. m., August 24, via Lake Shore Railway.
 Leave Buffalo 11.00 p. m., August 23, via Lake Shore Railway.
 Arrive Chicago 11.50 a. m., August 24, via Lake Shore Railway.
 Leave Detroit 12.30, p. m., August 24, via Michigan Central Railway.
 Arrive Chicago 7.40 p. m., August 24, via Michigan Central Railway.
 Leave Minneapolis 10.05 p. m., August 24, via Chicago & Northwestern.
 Leave St. Paul 10.40 p. m., August 24, via Chicago & Northwestern.
 Leave Sioux City 7.50 a. m., August 25, via Chicago & Northwestern.
 Arrive Omaha 11.25 a. m., August 25, via Chicago & Northwestern.
 Leave Des Moines 8.30 a. m., August 25, via Chicago & Northwestern.
 Arrive Ames 9.35 a. m., August 25, via Chicago & Northwestern.
 Leave St. Louis, Evening, August 24, via Any Line.
 Leave Kansas City, Evening, August 24, via Any Line.
 Arrive Omaha, Morning, August 25, via Any Line.

RAILROAD FARES.

Going via the route of the official train to San Francisco, Cal., thence
 returning via any direct line from California, rates will be as follows:

From Boston, \$106.75; from New York City, \$98.80; from Philadelphia, \$95.20; from Chicago, \$62.50. Going via route of official train to San Francisco, thence to Los Angeles and returning via North Pacific Coast (Portland, Seattle, or Vancouver), the cost will be \$17.50 higher (destination of tickets, San Francisco), with an additional charge of \$4 if side trip Los Angeles to San Diego and return is desired. The entire route must be selected at the time tickets are purchased. Correspondingly low rates from your home station.

SLEEPING CAR RATES TO SAN FRANCISCO.

| From | Lower. | Upper. | Compartment. | Drawing-Room. |
|--------------------|---------|---------|--------------|---------------|
| New York City..... | \$20.00 | \$16.00 | \$56.00 | \$71.00 |
| Philadelphia | 19.50 | 15.60 | 55.00 | 69.00 |
| Chicago | 15.00 | 12.00 | 42.00 | 53.00 |
| Omaha | 13.00 | 10.40 | 36.50 | 46.00 |

GENERAL INFORMATION.

In order to secure sleeping car accommodations it will be necessary to make application as soon as possible.

On account of the heavy travel, it would be advisable to make hotel reservations in advance, and these can be secured through the Official Exposition Hotel Bureau, Flannery Building, San Francisco, Cal.

Literature descriptive of the route of travel, the Expositions, etc., will be sent you on request.

Any of the representatives noted below will be pleased to assist in arranging your trip and make whatever sleeping car reservations you may require.

REPRESENTATIVES: CHICAGO & NORTHWESTERN LINE.

Boston, Mass., 322 Washington Street, J. E. Brittain, Gen. Agt.

Buffalo, N. Y., 301 Main Street, H. B. Loucks, Jr., Gen. Agt.

Chicago, Ill., 148 South Clark Street, H. A. Gross, G. A. P. D.

Cincinnati, Ohio, 434 Walnut Street, N. M. Breeze, Gen. Agt.

Cleveland, Ohio, 207 Euclid Avenue, A. R. Gould, Gen. Agt.

Des Moines, Iowa, 602 Walnut Street, J. J. Livingston, Gen. Agt.

Detroit, Mich., 30 Fort Street, West, W. L. Stannard, Gen. Agt.

Duluth, Minn., 302 West Superior Street, E. J. Garland, G. A. P. D.

Indianapolis, Ind., 611 Merchants Bank Building, A. W. Bower, Gen. Agt.

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St. Louis, Mo., 315 North Tenth Street, G. F. Brigham, Gen. Agt.

St. Paul, Minn., 396 Robert Street, H. H. Lankester, G. A. P. D.

Sioux City, Idaho, Security Bank Building, M. M. Betzner, Gen. Agt.
Toronto, Ont., 46 Yonge Street, B. H. Bennett, Gen. Agt.

REPRESENTATIVES: PENNSYLVANIA LINES.

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Pedrick, Jr., D. P. S.
Cincinnati, Ohio, E. M. Bronson, S. E. P. A.
Dayton, Ohio, C. C. Haines, D. P. A.
Harrisburg, Pa., A. E. Buchanan, D. P. A.
Indianapolis, Ind., F. A. Bauchens, A. G. P. A.
Louisville, Ky., C. H. Haggerty, A. G. P. A.
New York City, 263 Fifth Avenue, Oliver T. Boyd, D. P. A.
Philadelphia, Pa., 1433 Chestnut Street, F. B. Barnitz, D. P. A.
Washington, D. C., Fifteenth and G Streets, T. L. Lipsett, D. P. S.

THE FORSYTH DENTAL INFIRMARY FOR CHILDREN

140 THE FENWAY, BOSTON, MASS.

PERMANENT STAFF APPOINTMENTS.

An examination of graduates in dentistry (of less than three years standing), for appointments to positions on the Permanent Staff for full and one-half time service will be held on Monday, June 14, at the Infirmary.

Appointments will be made for one or two years as follows:

Full time service requiring every day from 9 a. m. to 5 p. m., with one afternoon off a week, at a salary of \$1,000 per year. One-half time service requiring twenty-four hours per week, salary \$300; and will be made subject to satisfying the requirements of the Massachusetts State Board of Registration in Dentistry.

Members of this staff will be entitled to the advantages of reports and clinics by experts in the various branches of dentistry, from different parts of the world, in addition to the numerous regular clinics.

All material and necessary operating instruments will be furnished; up-to-date apparatus including electric engines, sterile instrument trays, fountain cuspidors, compressed air and modern operating-room-type lavatories are available for use.

A diploma of service will be issued to each member of this staff who has completed this term to the satisfaction of the trustees.

Applications for the above positions should be made to the director, Harold DeW. Cross, D.M.D., 140 The Fenway, Boston, Mass., who will gladly furnish information to those interested.

UNDERGRADUATE ASSISTANTS.

During the months of June, July, August, and September an opportunity is offered by the trustees of the Forsyth Dental Infirmary for Chil-

dren to a limited number of undergraduate students to act as assistants in the clinics of the Infirmary. This privilege permits a student to obtain unusual clinical advantages in the various departments of the institution where Operative Dentistry, Orthodontia, Nose and Throat, Oral Surgery, Radiography, Pathological Diagnosis, and Research Work are continually carried on.

Operators' gowns and all instruments are furnished. Over three hundred children are treated daily.

For further details apply to the director, Dr. Harold DeW. Cross, 140 The Fenway, Boston.

NEW JERSEY BOARD OF REGISTRATION

The State Board of Registration and Examination in Dentistry of New Jersey will hold their annual meeting and examination in the Assembly Chamber, at the State House, Trenton, N. J., on June 28, 29, and 30, 1915. License fee, \$25. No interchange of license.

Practical tests required. Gold filling in a proximal surface of a tooth, and one amalgam filling will be required. Also the soldering of a bridge consisting of three or more teeth, exclusive of abutments, and one Richmond crown, mounted and articulated, of gold or coin silver.

Attention is directed to the following requirement: "All applicants for a license to practice dentistry in New Jersey shall present to said Board a certificate from the Superintendent of Public Instruction, showing that before entering a dental college, he or she had obtained an academic education, consisting of a four years' course of study in an approved public or private high school, or the equivalent thereof."

In accordance with the above law, the Secretary will issue application blanks to applicants only upon presentation of the required certificate from the Superintendent of Public Instruction, Trenton, N. J.

Applications must be filed complete ten days before the date of the examination.

Address all communications for further particulars to

JOHN C. FORSYTH, *Acting Secretary*,
430 East State Street,
Trenton, N. J.

VERNON D. ROOD, D.D.S.,
Secretary.

ADVANCE NOTICE.

At the meeting of the State Board of Registration and Examination in Dentistry to be held at the State House, Trenton, N. J., December 6, 7, 8, and 9, 1915, the following practical tests will be required:

Insertion of a proximal gold filling, compound proximal amalgam filling, and a silicate filling, besides a practical test of the applicant's ability in oral prophylaxis. Also preparation of a cavity for an inlay with wax pattern.

Prosthetic Dentistry.—Five-piece bridge and Richmond crown in addition to an anatomical articulation of a full upper and lower set of teeth. Teeth to be furnished by applicant. Wax bites properly trimmed, and in place on models for inspection before setting up teeth.

In addition, Dental Jurisprudence and Bacteriology will be added to the theoretical examination.

JOHN C. FORSYTH,
Acting Secretary.

THE NEW JERSEY STATE DENTAL SOCIETY

The forty-fifth annual convention of the New Jersey State Dental Society will be held at Asbury Park on July 21, 22, 23, and 24, 1915.

The headquarters will be located at the Coleman House. The ball room will be used for all meetings of the Society.

The glass inclosed Casino over the ocean, just across the ocean drive from the Coleman House, has been secured for the Exhibits and Clinics. With over 2,000 more square feet of floor space than the pavilion used last year, there should be adequate room.

Dr. Chauncey F. Egel, of Westfield, N. J., is chairman of the Exhibit Committee.

Dr. W. W. Hodges, of Perth Amboy, is arranging for an attractive list of clinics.

The Essay Committee, under the chairmanship of Dr. James I. Woolverton, of Trenton, will have three essayists of prominence to present.

A cordial invitation to attend is extended to all ethical practitioners.

JOHN C. FORSYTH,
Secretary.

430 East State Street,
Trenton, N. J.

F. D. I.

The next meeting of the International Dental Federation will be held September 2, 3, 1915, at San Francisco, Cal.

Headquarters will be at the Clift Hotel.

TRUMAN W. BROPHY, President.

BURTON LEE THORPE, Assistant Secretary,
3605 Lindell Boulevard, St. Louis, Mo.

NORTHEASTERN DENTAL ASSOCIATION

The Northeastern Dental Association will hold its twenty-first annual meeting in Springfield, Mass., on October 13, 14, and 15, 1915.

ALVIN A. HUNT,
Secretary.

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1915

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THE JOURNAL

OF THE

ALLIED DENTAL SOCIETIES

VOL. X

SEPTEMBER, 1915

No. 3

ARE DENTISTS QUALIFIED TO DO MEDICAL RESEARCH WORK ?

BY EUGENE S. TALBOT, M.D., CHICAGO, ILL.

"In the field of observation chance favors only the mind which is prepared."—PASTEUR.

After seventy-four years of existence, the dental profession is suddenly called upon to do original research work upon diseases of the mouth. Is it qualified to do it? Before answering this question let us consider what requirements are necessary for a person to do medical research, and what qualifications we as a profession possess at the present time. No one can question the fact that the study of diseases of the mouth, other than those of the teeth, must naturally come under the head of "medical research."

Lately there is a tendency on the part of the dental profession to undertake original research work. A committee has been appointed by the national body for the purpose of raising money and also distributing the same among those who are willing to undertake such work. More than forty thousand dollars have been raised to forward this movement. It is gratifying to see this burst of enthusiasm at this late day. Many of us who have been in the practice of dentistry for over forty-five years are tired of seeing and reading the same old papers in nearly every dental journal on the subject of "Oral Hygiene" and so-called "Pyorrhea Alveolaris," etc., which were originally published over four decades ago. Hundreds, and I might say thousands, of papers have been written upon these and many other subjects

rehashed from papers previously written, without there being a single new idea or thought expressed. The same statements appear which were contained in the earlier papers, the authors of which have passed to the great beyond many years ago. Those who are familiar with dental literature can tell beforehand what the essayists are going to discuss, and in many instances can refer to the previous paper and the person who wrote it. How a body of supposedly trained professional men can sit the whole evening hearing a paper read and discussed, the same thoughts expressed which had been published over and over again, is beyond my comprehension. Is it to be wondered that the lamented Dr. Sudduth, the then editor of *The International Dental Journal*, stated "that the dental profession had written itself out"? He became tired of receiving material month after month for the *Journal* which did not contain a new thought.

Books of many hundreds of pages are being published at the present time upon special subjects, without a quotation or with hardly a single reference. A person must have an exalted opinion of himself if he thinks he is the only person that has given thought to a given subject while those who have gone before have spent their lives fruitlessly. Does it not appeal to these individuals that in the eyes and estimation of the intelligent public that their own productions are of little value? Do they not understand that in writing books and papers, frequent quotations show a breadth of reading and are an indication of their knowledge of a given subject and that they place the author on a higher plane of intellectual ability?

Where is our dental literature, may I ask? For a specialty in medicine we have plenty of printed pages, but little or no originality. In looking over the literature, who can find the names of those who uttered the first thought? How many, in reading a paper or discussing it, ever think of crediting those who have worked along those lines before? Examine a dental journal and you shall see that the "intellectual feast" (?) has been confined strictly to those present. The fathers who did the pioneer work and presented the original ideas are either dead or absent (they were certainly not at the meeting), and therefore do not concern those present. This method of dealing with

science and its record does not lay the foundation for future improvement or creative assets.

The first thing, therefore, to give our specialty a standing and a foundation in original research is to have a literature of ideas instead of repetition. No one can undertake investigation upon any subject in an intelligent manner without first knowing all that has been written before, and, as an accepted courtesy, due credit should be given to whom credit is due. If this principle is adopted and due credit given in each paper or book, in a few years we shall possess a literature equal to that of the medical profession.

What Is Research?

Research, according to the New International Dictionary, is "a careful, critical inquiry or examination in seeking facts or principles; diligent investigation in order to ascertain something. To search, examine or study with diligence or care." The investigation may be conducted along any line of inquiry, but for our present purpose it will be confined to medical research. Medical research, therefore, is intended to add new facts to what has already been published or is known. Research does not mean going over and over what has already been recorded and proved to be a fact. Such work may be done for practice or to confirm the work of previous investigators, but would not be permitted at a meeting of scientific men or published as original work. In these enlightened times the individual who publishes statistics or ideas as facts, if not proved to be new work, places himself out of scientific rank, and therefore does not benefit himself or his profession.

The investigator is, first of all, one who thinks as much of what we are ignorant as he does of what has already been made clear. His chief interest is in the territory which has not yet been traversed. Indeed, he is to be classed with explorers and pioneers.

When young we all have the instinctive curiosity concerning the world about us, a curiosity which most of us gradually raise as we fit ourselves into the usual conditions. The investigator is one, however, in whom this natural curiosity still persists.

The process of scientific inquiry involves special qualifications which cannot be disregarded by any one who thinks of trying it. Research implies, in the first place, seeking again over a region which has been previously traversed, in order to learn what other men have done, and the point where their labors ended. To make progress sure, therefore, previous records must be carefully studied. The failure to pay just tribute to those who have labored before has not seldom led to fruitless efforts or to vain repetition of work already done. Marking the boundaries, then, demands a scholarly acquaintance with early discoverers; and the painstaking methods of the scholar must be used.

An ingenious and inventive imagination is necessary. It serves to indicate where the problems lie and also to suggest possible methods of solving them. The mind must be hospitable to all ideas thus presented, and yet it must receive them with skeptical scrutiny. Considering a plan of solving a problem, it is often possible to select central tests, which is strategically related to the logic of the entire research. The physiologist Goltz is said to have done his most important work while fishing, for he employed that time in devising crucially significant experiments. Some experiments require patience and an enthusiasm which is intelligently persistent. The very soul of research is the highest degree of modesty. The investigator should see clearly and accurately with an eye single to the truth. He has to consider not only the observation which fit his theory, but all others as well.

Minot¹ says the research-worker must possess the faculty of accurate observation. Accurate observation is the most difficult art we have to acquire. We have plenty of successful politicians and statesmen, abundance of military talent, gifted lawyers, doctors, artists, authors, but a single master of the art of observation is scarcely born in many years.

This is not generally conceded, but the fact is beyond controversy. While members of the profession already mentioned have excelled in their respective callings, the scientific investi-

¹ Minot, "*Certain Ideals of Medical Education.*" *Medical Research and Science*, Vol. 2, page 279.

gator, to establish a truth beyond a doubt, must renew his work by every method of reasoning, or others must confirm or reject his findings until every doubtful point has been removed. Observation is accurate only when it attains absolute perfection. This ideal is so exalted that rarely a person can attain to perfection. In the last century England produced a Darwin, Germany a Helmholtz, France a Pasteur, while America has yet to produce a great scientist.

No young man without perseverance and severe training can expect to make his mark in research work. The true investigator requires the right training of the brain rather than that of the eye. This requires a broad scientific education. The organs of the senses are imperfect and limited in their actions, while the mind, when well trained, works with wonderful accuracy. Successful scientific research, then, requires three mental factors—intelligence, concentrated attention, and judgment.

The observer must have a clear understanding of the conditions by which the character of his observation is determined before he begins his work. He must have a clear idea of what he is to look for and a technical knowledge of the methods of procedure. Intelligence, therefore, is essential to master methods. Without this the investigator is unable to familiarize himself with the methods used and to appreciate the benefits of his successes and failures.

Concentrated attention is all-important and one of the most difficult virtues to command. It is easy to receive a general impression, but the mind not concentrated thereon soon passes to something different and of fresh interest. To succeed in a given undertaking, one must concentrate his mind on the subject for days, months, and often for years. An illustration of this is the fact that it required eight years to collect and classify irregularities of the teeth. It is by trained attention that we are able to acquire accuracy and thoroughness.

Judgment is one of the highest acquirements. It is one thing to collect data, but to place it on an intelligible basis for general observation is quite another proposition. Many men otherwise intelligent and able, who have given years to their best efforts, have failed because they were unable to place the

results of their work before the profession in an understandable manner.

The scientific method is based on one's belief that invariably the evidence must be wholly and exclusively on one side. If there is an apparent conflict, the duty of judgment is to find out first what part of the evidence is erroneous, securing what logical errors have occurred in the deductions drawn from observation. Specialization in the learned profession cannot be accomplished without the whole, for every part of our body is related so intimately to every other part that no specialist can deal with his subject as an isolated field of practice. The dentist must keep up with the general progress of knowledge. Judgment must first decide whether the ascertained data are to any extent erroneous; second, to what extent they are incomplete. For such a decision in any department of research to-day, a thorough expressed knowledge of the special subject is necessary, which must include intimate acquaintance with all previous work—an acquaintance often shirked—and also intimacy with all possible sources of error.

Scientific judgment is a mental faculty which becomes efficient only after long experience and development. Judgment renders its loftiest service when it deals with legitimate induction from data. Then follows the proper raising process, which, if successful, carries us beyond the observation to a generalization which marks part of the growth of science.

Are Dentists Qualified to Do Research Work?

From what has been said the dentist should possess a broad general academic education. He should thereby possess a knowledge of the fundamental principles of all sciences. This knowledge will permit him to compare these principles and demonstrate their relationships, one to the other. This must include biology in all its departments, chemistry and physics.

To do medical research work he must have taken a full and complete course in all branches of medicine. This is necessary in order that the investigator may compare and understand diseases in different structures of the body. The amount of time and labor spent will be readily appreciated.

As a rule, research workers are born, and not made. They must possess a real desire for this kind of work. In order to do this work one must give his entire time and thought to it, forsaking pleasure, recreation and almost family ties, to accomplish the desired results.

Money will not purchase the genius for research. The underlying principles are so necessary at the present time that one cannot stumble onto original work.

A physician who recently made a world-wide reputation, early refused a salary, I am informed, of \$10,500, preferring to remain in the laboratory conducting research at a salary of \$3,500. The man capable and anxious to do research work does not consider the financial side of the question, but will naturally plod along upon a very meager recompense. It is a difficult proposition to carry on two lines of business unless one possesses a constitution and a desire strong enough to work overtime. Research work is in a class by itself, and few are capable of doing it.

The student should receive his education, academic as well as medical, in a methodical way. The details and methods of laboratory work required in both the academic and medical schools will convince him, by the time he graduates in medicine, whether he is qualified to undertake research work or not. The mere fact that the student prefers laboratory work to the practice of medicine does not qualify him as a research-worker. He must possess, among other things, genius for original thought to carry the work beyond that of previous investigators. The mere fact of being able to do over the laboratory work of others is not research.

To do research work one must begin as soon as he graduates from college. His mind is fresh and clear. He possesses the vigor of youth and his brain is able to develop the extraordinary faculty for original discovery, production or achievement.

Dr. Osler,² in his valedictory address at Johns Hopkins University, said:

The comparative uselessness of men above forty years of age. . . .
Take the sum of human achievement, in action, in science, in art, in litera-

² *Journal of A. M. A.*, March 4, 1905, p. 705.

ture—subtract the work of men above forty; and while we shall miss great treasure, even priceless treasure, we shall be practically where we are today. . . . The effective moving vitalizing work of the world is done between the ages of twenty-five and forty.

In the science and art of medicine there has been an advancement of the first rank which has not been initiated by young or comparatively young men. . . . To modify an old saying, a man is sane at thirty, rich mentally at forty, wise spiritually at fifty—or never. The young men should be encouraged and afforded every possible chance to show what is in them. . . . Herein lies the chief value of the teacher who has passed his climacteric and is no longer a productive factor; he can play the man mid-wife as Socrates did to Thesetetus, and determine whether the thoughts which the young men are bringing to light are fatal idiots or true and noble births. . . . The teacher's life should have three periods; study until twenty-five, investigation until forty, professor until sixty—then retire on a double salary.

The original research-worker must associate with men who are better educated than himself, in order to keep up the enthusiasm. He must attend medical society meetings in all departments of medicine. Thoughts expressed at these meetings will freshen his mind and he will obtain ideas which he can readily apply to the work he has in hand.

Because the attention of the dental student is fixed so definitely on the practice of his calling, he may entirely fail to understand the nature of scientific research, the sort of value it possesses or the incentive which impels the student to its pursuit; in short, he may remain quite unaware of what productive scholarship in the medical sciences really implies, yet the work of investigation is of prime importance to dentistry, and it yields some of life's profoundest satisfactions to the man who pursues it.

The age in which we live is preeminently an age of restlessness, if not impetuous inquiry. Already research laboratories have been established in connection with The Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, The Forsyth Infirmary for Children, The Harvard University Dental School, and The Dental Department of the University of Illinois; while other university dental schools will soon offer similar opportunities for research work. The development of establishments through which research may

be pursued, patiently and systematically to demonstrate conclusions is one of the most essential agencies for the conservation of the best interests of our specialty. The dental student of to-day has advantages never offered to him before. If, therefore, the coming dental student has a proper preliminary training, there is no reason why he should not be qualified to compete with the medical student.

It will be seen that the dentist in practice has not been trained for research work. While it is possible that occasionally one may be found who has inherited the qualities required for this line of work, most practitioners lack the education, ability and training successfully to carry on the work. While the early education and training are lacking, the atmosphere of the college is not in harmony with this kind of work. The mechanics of dentistry permeate the institution, to the detriment of the scientific side of the profession. No artist in music, painting or sculpture can become great, or even make a modest showing, without spending years in European centers where the atmosphere is thoroughly saturated and the environment filled with the artistic spirit. The same is true of medical research in the mouth. If, therefore, the dental profession is interested and in earnest in this respect, the schools must so arrange their methods of teaching that the student, when he graduates, will be qualified to begin research on an equal footing with students in other departments of medicine.

Since the dental profession as a whole is unqualified to take up the subject of original research, I would recommend that the teachers in our dental schools who are about to establish a four-year course, read the addresses by the ablest teachers in the country, published in *Medical Research and Science*, Vol. 2, and from which some of the ideas in this paper are taken.

To all those who contemplate doing research work I would recommend them to read the life of Louis Pasteur, by René Vallery Radat.

CHEMICAL STUDIES OF THE RELATIONS OF ORAL MICROORGANISMS TO DENTAL CARIES¹

BY WILLIAM J. GIES AND COLLABORATORS.

3. A Biochemical Study and Differentiation of Oral Bacteria with Special Reference to Dental Caries (continued) (II)²

BY I. J. KLIGLER.

(From the Biochemical Laboratory of Columbia University, at the College of Physicians and Surgeons, New York.)

II. EXPERIMENTAL.

(First section)³

I. Plan of Work.—From a general survey of the literature, and from a few preliminary experiments, it became evident that methods other than those utilized in the past would be necessary in order to avoid most of the errors of earlier workers. The variety of oral bacteria, as was pointed out before, is legion. The types of real significance, on the other hand, are relatively few in number. The accidentally occurring strains are presumably few in number, whereas those of real significance are relatively numerous. If common qualitative culture methods are employed with ordinary media, however, relatively unimportant individuals overgrow the less cultivable but more important organisms and assume a prominence that is devoid of oral significance.

¹ Reports of findings in investigations conducted under the auspices of the First District Dental Society of the State of New York.

It had been our intention to present, in this issue of the *Journal*, the remainder of the report on our work for the academic year 1913-1914, as already suggested by us (*Journal of the Allied Dental Societies*, 1915, x, p. 137), but details in our recent bacterio-chemical study have become so numerous that publication, in this issue, of the preliminary *experimental* data in our report for 1914-1915 is particularly desirable, as a further prelude to our oral report, next November, on the *chemical* findings. The concluding portion of the report for 1913-1914, on effects of food-acid media, will be published in the next issue of this *Journal* with the remainder of the report for 1914-1915.

The introductory and historical portions of these studies were published in the last previous issue of the *Journal of the Allied Dental Societies* (pp. 137 and 141).

² Accepted by the executive officer of the Department of Biological Chemistry of Columbia University as *Part II* of a dissertation, submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, in the Faculty of Pure Science, Columbia University, June, 1915.

The bacteriological experiments were conducted in the laboratory of the Department of Public Health of the American Museum of Natural History, under the supervision of the executive officer of the Biochemical Department of Columbia University. At Dr. Gies's request we were privileged to obtain, at the Clinic of the New York College of Dental and Oral Surgery, numerous oral specimens. We are indebted to Drs. Louise C. Ball and Frank L. Chambers for courteous and very helpful cooperation in this connection.

³ The concluding section of this dissertation will be published in the succeeding issue of the *Journal of the Allied Dental Societies*.

The same observation was made by MacNeal (21) and his co-workers in their admirable study of the fecal flora of man.

As a result of these considerations it was decided to adopt a quantitative technique and to employ media suitable for the purpose. Serious difficulties were encountered, however, in determining the methods to be used and the kind of media best adapted for the oral flora. In the first place, it was clear that an examination of saliva alone would not serve our purpose, for a study of the flora of saliva would reveal relatively little regarding the nature of the flora in the deposits on teeth. It was an essential part of the plan to make a systematic study of the bacteria in ordinary dental deposits and in decayed enamel, dentin and pulp; but the amount of deposit on normal clean teeth is usually very small, and the collection and weighing of such minute quantities of material, under the required conditions of sterility, offered serious difficulties. So also, it was hard to decide what media to use. Glucose-agar seemed desirable but, on that mixture, the streptococci and acid-forming diplococci grew so rapidly and elaborated so large an amount of acid that the slowly growing types never got a chance to make a start. Gelatin might have been useful were it not for the fact that most of the typical mouth flora fail to grow at room-temperature. After a considerable amount of preliminary work the following series of methods was adopted.

2. **Methods.**—COLLECTION AND WEIGHING OF SPECIMENS.

A small glass vial, about $\frac{3}{4}$ cm. in diameter and 4 cm. long, and weighing about 4 gm., was tightly closed with a one-hole rubber-stopper in which was fitted a narrow glass-rod drawn out in delicate spatula-form at the inserted end. (See Figure, page 284.) The tip could easily be broken from this delicate spatula. The vial was covered, at the upper part, with tin-foil and sterilized in an autoclave under 20 lb. pressure for 5-10 minutes. The vial was then placed upright in a desiccator until ready for use. Just before using the vial, the tin-foil was carefully removed and the vial weighed accurately to milligrams. The spatula was then cautiously withdrawn by means of the rubber stopper, the vial being held with a sterile dry cloth; deposit on a tooth or teeth was carefully removed on the spatula which was then returned to the tube, the tin-foil replaced and the whole put in a desiccator until ready for sampling. The time between the collection

of the specimen, and the weighing and plating, was never more than an hour, usually less; often, as in the case of the specimens from healthy teeth, only five or ten minutes elapsed. Just before plating, the vial, with the scrapings, was again weighed in order to determine by difference the weight of the material obtained. The spatula was then carefully removed and inserted into the mouth of a sterile dilution bottle. By slight pressure of the rod against the inside of the bottle the spatula-tip was broken off at the drawn-out part and fell into the dilution bottle.

SAMPLING OF SPECIMENS. The bottle contained 10 c.c. of sterile water and a number of sterile round glass beads. After the specimen had been added the bottle was shaken vigorously to produce a uniform suspension. This was used as a stock supply; and, by withdrawing volumes of 1 c.c. and mixing them with various amounts of sterile water, any number of desirable dilutions could be prepared. The dilutions were made with one-tenth of the original material in a definite quantity of water; corrections were made later on the basis of actual mass of substance present.

DETERMINATIONS OF THE NUMBER OF BACTERIA. *Microscope-Count.* That cultural methods reveal only a small fraction of a bacterial flora is well known. Winslow (32) found that the microscope-count in sewage effluents is often one hundred times as great as the plate-count. MacNeal, Latzer and Kerr (21), in their study of fecal flora, noted even a greater divergence

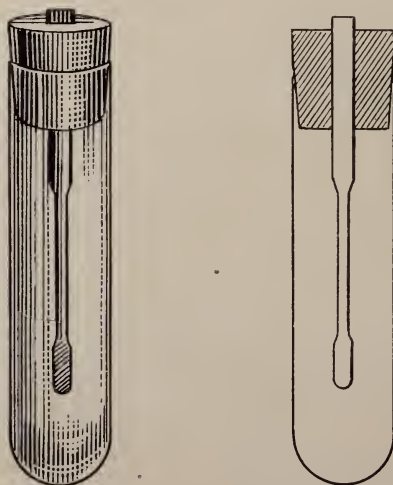


Diagram of vial-apparatus used for the collection and weighing of specimens

between the two counts. Several causes probably contribute to this difference. There are present, very likely, many bacteria that are not cultivable under given artificial conditions, or are kept out by their more greedy, more readily adaptable or hardier associates. The discrepancies may also be accounted for, in part, by the extreme difficulty in breaking up bacterial clumps.

An interesting question arises in this connection. Are the many uncultivable bacteria living cells that would continue to develop in their natural environment but are unable to do so in the artificial environment? Klein (16) claims that the bacteria (fecal) which fail to develop are dead. Winslow, on the other hand, found that when pure cultures of a cultivable bacillus were used, the plate- and microscope-counts were the same, and that dead cells rapidly disintegrated and failed to stain with the anilin dyes. It is quite likely, therefore, that most of the stained cells seen in a microscopic field represent living organisms, capable of developing under favorable conditions. Hence a microscope-count is of considerable value as indicating the total flora present under given conditions.

A number of methods for direct counts have been suggested at various times. The one devised by Winslow (32) for his sewage work was found satisfactory for our purpose; and, except a few determinations with the method used in counting milk, was employed in all the experiments. The method, to quote Winslow (32), "consists in spreading a definite amount of the emulsion evenly on a cover-slip and allowing it to dry in the air." After drying, it is fixed by passing through the flame, covered with Ziehl-Nielsen's carbol-fuchsin solution, warmed till steam rises, washed, dried and mounted. In my work 0.1 c.c. of the original 10 c.c. of stock solution was spread uniformly over a square cover-slip $\frac{3}{4}$ inch on each side, and allowed to dry at room temperature. The preparation was then fixed in a flame, stained with steaming fuchsin, mounted on a slide so that the diagonal of the slip was parallel with the long edge of the slide, and squares counted with the Sedgwick-Rafter micrometer eye-piece. Usually 20 fields were counted in different parts of the cover-slip and the average taken. The microscopic field was so adjusted that a factor of 50,000 was obtained (the area of the field times the area of the cover-slip), which,

when multiplied by the count, gave the number of bacteria in 0.1 c.c. or 0.01 of the total mass used. Multiplying this figure by 100 and dividing by the number of milligrams in the original mass, the total number of bacteria in 1 mgm. of oral material was obtained.

In general it was found that under normal conditions, the number of bacteria varied directly with the mass of the deposit on the teeth; whereas under pathological conditions, the count varied with the stages of decay.

Plate-Method. For quantitative determinations, four different sets of plates were made: (a) Litmus-glucose-agar and (b) agar plates, both of which were incubated at 37° C., under aerobic conditions. (c) Litmus-glucose-serum-agar plates, incubated at 37° C. in an anerobic jar, using the combination of exhaustion and alkali pyrogallol. This method did not always give satisfactory anerobic conditions. (d) Glucose-agar plates were poured and rendered anerobic according to the method suggested by Krumwiede (19). This method gave satisfactory anerobiosis but introduced another serious difficulty in the large number of spreaders.

The four sets of plates presented different conditions and there was considerable variation in the flora on each set. Gelatin plates were not made since preliminary tests of, and plates from, the first few samples showed that most mouth forms fail to develop at room temperature. All the plates were generally incubated for from 4-5 days, this long period being especially important in bringing to light the slow growing leptothrix type.

Different dilutions were made in the usual manner from the original stock suspension, and plates made from the higher dilutions only. The dilutions used for plating depended, of course, on the mass of the scrapings and on the abundance of bacteria in it. After the incubation period the plates were counted, the average from the various plates taken and the number of bacteria per milligram of the original mass, under each condition, calculated.

QUALITATIVE STUDY OF TYPES. Of the different sets of plates those showing least crowding were examined microscopically with low magnification, and characteristic colonies were transferred to an appropriate medium (agar, glucose-agar or serum-

glucose-agar) and retained for more detailed biochemical and morphological study. Attempts were made to obtain representative colonies so as to get an approximate idea of the relative importance of the various types. Since all the colonies were picked from dilutions of 1:1000 or over, the selected forms represented only those types of organisms which were relatively most abundant in a particular specimen. It will be noted later that the prevailing types of organisms varied with the condition of the teeth—one type of flora displacing others in a definite and uniform manner.

To make sure that the anerobes which Rodella claimed to have found in saliva would not escape detection, if any were present, tubes of the meat-egg mixture recommended by Rettger (27) were incubated under anerobic conditions at 37° C. for 3-4 weeks. Anerobic plates and deep glucose-agar shake-cultures were then made and typical colonies fished and examined. This method was very useful for the isolation of anerobes that were often overgrown and hence not detected on the direct plates.

3. **Sources of Material.**—Specimens were taken from forty individuals ranging from “immunes” (people who never had caries or only slight defects) to those whose teeth were in the last stages of decay. Twenty of the specimens were taken from healthy teeth in mouths of various degrees of cleanliness with the object of obtaining as broad a survey of the prevailing conditions in ordinary “clean” and “dirty” mouths as was possible in the time available. This survey was also intended to serve as a basis for comparisons of the flora obtained from the pathological cases. The other twenty samples were taken from decayed teeth in different stages of decay. This material was obtained either with the glass spatula described above (Fig. 1) or with the aid of a sterile excavator. The patients were examined by trained dentists and the exact diagnoses made by them were recorded. Specimens were thus obtained from teeth in the primary stages of decay as well as from teeth in which the dentin and pulp also were affected.

Among the first twenty specimens are some taken from the same individual on different occasions either before the morning brushing and after, or before and after the noon meal. In this

manner it was hoped to obtain a general preliminary indication of effects of the environment (the condition of the mouth, food, etc.) on the character of the flora. It would have been desirable thoroughly to study these phases of the problem; it was thought best, however, for a survey of this sort, to select as many distinct types as could be conveniently handled without incurring risk of the confusions that might result from premature extension of our studies at this stage of their progress.

4. **Results.**—**BACTERIOLOGICAL DATA.** The cases studied fall into two main divisions—normal and carious teeth, respectively, each of which groups may again be subdivided into subgroups based either on the condition of cleanliness of the mouth or on the extent of the decay. The division between “clean” and “dirty” mouths was, of course, somewhat arbitrary; but, in the case of the carious teeth, the separation was based on the diagnosis of trained dentists. These groups are summarized below; the various results obtained will be presented under these heads.

A. *Normal Teeth.*—

- (1) Material taken from healthy teeth of “immune” individuals.
- (2) Material taken from healthy teeth of individuals whose mouths were cleaned regularly but who at one time or another have had caries.
- (3) The same as (2) but from individuals whose mouths were “dirty” and poorly cared for.
- (4) Material taken from healthy teeth, from mouths in various conditions of cleanliness, in the morning before the usual brushing and after.
- (5) Same as (4) but taken before and soon after the noon meal.

B. *Carious Teeth.*—

- (6) Material taken from teeth in the first stages of caries, the enamel only being affected.
- (7) Material taken from teeth in which both enamel and dentin were involved.

- (8) Material taken from teeth in which decay had gone far enough to expose the pulp, though the latter was not involved.
- (9) Material taken from teeth in the final stages of decay, the pulp being involved.

QUANTITATIVE RESULTS: NORMAL TEETH. *Group 1.* The quantitative results include both the plate- and microscope-counts. As was to be expected, the microscope-count was considerably higher, even if the aerobic and anerobic plate-counts are totaled as distinct values. Unfortunately, "immunes" are not so easy to obtain, and of the twenty samples from normal teeth only two were taken from individuals who have never had caries. In each case the mouth was carefully cleaned regularly and the dentist visited about once a year. The amount of dental deposit was small, and both the microscope- and plate-counts were relatively low. Roughly, the microscope-count was 5-6 times as great as the combined aerobic and anerobic counts on glucose-agar. The results for this group are indicated in Table I.

From the chemical and biological standpoints it is interesting to find that the number of organisms that develop on the glucose-containing medium is greater even in this group than that on the ordinary agar. The *normal* oral flora is, on the whole, distinctly *acid-producing* in character. It is also notable that a larger number of organisms seems to develop under anerobic conditions on the glucose-containing medium.

TABLE I.—DATA PERTAINING TO TEETH "IMMUNE" TO DENTAL CARIES.

| No. of specimen | Source of specimen | Condition of mouth and teeth | Microscope-count No. per mg. | Plate-count. No. per mg. | | | |
|-----------------|------------------------------------|--------------------------------------|------------------------------|--------------------------|----------|-----------|---------|
| | | | | Aerobic | | Anerobic | |
| | | | | Agar | Gl.-agar | Krumwiede | Jar |
| 3 | Deposit on incisors and canine. | Very clean. Teeth in fine condition. | 15,000,000 | 350,000 | 430,000 | 2,000,000 | ..... |
| 9 | Deposit on incisors and bicuspids. | Very clean. Teeth in fine condition. | 6,000,000 | 200,000 | 680,000 | 640,000 | 300,000 |

Group 2. The cases falling into the second group show on the whole (as seen from Table II) a higher microscope-count, though the plate-count is not materially increased. The striking point for this group is the high ratio of the microscope- to the plate-count, ranging from 12 to 1, to 40 to 1, and averaging 13 to 1. The average count for this group is generally twice that of Group 1. (See Table X). Another suggestive fact is the apparent, though less marked, increase in the number of cultivable bacteria for the last four cases in Table II. These subjects, while giving as much attention to their teeth as those referred to in the first part of the table, were nevertheless much less successful in preventing dental deterioration. There may be a definite relation between the number of bacteria capable of developing on teeth and susceptibility to decay. Here again the presence of sugar in the culture medium is on the whole distinctly favorable for the development of these types.

Group 3. The data in Table III indicate two things: First, an enormous increase in both the microscope- and plate-counts

TABLE II.—DATA PERTAINING TO DEPOSITS ON HEALTHY TEETH IN
"CLEAN" MOUTHS.

| No. of specimen | Source of specimen | Condition of mouth and teeth | Microscope-count No. per mg. | Plate-count. No. per mg. | | | |
|-----------------|---------------------------------------|---|---------------------------------|--------------------------|----------|-----------|---------|
| | | | | Aerobic | | Anerobic | |
| | | | | Agar | Gl.-agar | Krumwiede | Jar |
| 2 | Deposit on incisors and canine. | Mouth clean; examined regularly. Had caries before. | ..... | 160,000 | 210,000 | 2,000,000 | ..... |
| 11 | Deposit on canine and bicuspids. | Mouth and teeth cleaned regularly. Teeth in good condition. | 25,000,000 | 350,000 | 190,000 | 500,000 | 450,000 |
| 13 | Deposit on bicuspids and first molar. | Teeth in good condition now. Mouth cleaned regularly. | 16,500,000 | 133,000 | 155,000 | 150,000 | 255,000 |

TABLE II (con.).—DATA PERTAINING TO DEPOSITS ON HEALTHY TEETH IN "CLEAN" MOUTHS.

| No. of specimen | Source of specimen | Condition of mouth and teeth | Microscope-count No. per mg. | Plate-count. No. per mg. | | | |
|-----------------|--|--|---------------------------------|--------------------------|-----------|-----------|---------|
| | | | | Aerobic | | Anerobic | |
| | | | | Agar | Gl.-agar | Krumwiede | Jar |
| 12 | Deposit on bicuspids and molars. | Mouth cleaned regularly. Teeth in good condition. | 40,000,000 | 160,000 | 200,000 | 140,000 | 140,000 |
| 1 | Deposit on incisors | Mouth cleaned regularly. Teeth in good condition; recently treated for caries of lower left molar. | ..... | 2,300,000 | 6,000,000 | 2,000,000 | .... |
| 5 | Upper incisors and canine | Teeth in poor condition; many caps and fillings. Mouth cleaned regularly. | 17,500,000 | 750,000 | 500,000 | ..... | 750,000 |
| 14 | Deposit on healthy bicuspids. | Mouth cleaned regularly. Teeth in poor condition. | 25,000,000 | 550,000 | 550,000 | 520,000 | 570,000 |
| 15 | Deposit on incisor adjacent to carious canine. | Mouth cleaned regularly. Teeth in poor condition. | 23,000,000 | 80,000 | 100,000 | 530,000 | 440,000 |

for "dirty" mouths; second, marked effect of tobacco on the number of bacteria in "dirty" mouths. For the individuals subject to the habit of chewing tobacco the microscope-count is the same as for those indicated in Table II, whereas the plate-count

is appreciably lower. Tobacco apparently serves the same purpose as the tooth-brush. Despite the increase in total numbers, the ratio for this group is about the same as for Group 2.

TABLE III.—DATA PERTAINING TO NEGLECTED TEETH IN "DIRTY" MOUTHS.

| No. of specimen | Source of specimen | Condition of mouth and teeth | Microscope-count No. per mg. | Plate-count. No. per mg. | | | |
|-----------------|--|---|------------------------------|--------------------------|-----------|-----------|-----------|
| | | | | Aerobic | | Anerobic | |
| | | | | Agar | Gl.-agar | Krumwiede | Jar |
| 10 | Deposit on incisors. | Mouth "dirty." Thick deposit on teeth. Cleaned irregularly. "Does not suffer from tooth trouble." | 54,000,000 | 1,090,000 | 1,800,000 | 1,100,000 | 1,000,000 |
| 4 | Deposit on bicuspids. | Mouth "dirty." Thick deposit on teeth. Rarely cleaned. Has never been to a dentist. | 41,000,000 | 1,670,000 | 1,920,000 | 3,000,000 | ..... |
| 7 | Scrapings from incisors. | Mouth in poor condition. Teeth cleaned infrequently. Chews tobacco. Teeth browned. | ..... | 160,000 | 500,000 | 400,000 | 80,000 |
| 6 | Scrapings from healthy incisors and bicuspids. | Mouth "dirty." Rarely cleaned. Chews tobacco. Teeth brown. Many teeth missing. | 25,000,000 | 330,000 | 170,000 | 250,000 | 200,000 |

Groups 4 and 5. The comparison between the counts ob-

tained before and after brushing, and before and after the noon meal, are shown in Tables IV and V respectively. Though the specimens were not taken on the same day before and after, and despite the fact that only three specimens were taken in each series, the results are so uniform and striking that there can be no doubt of their general correctness. The first series indicates that brushing removed at least $\frac{3}{4}$ of the total number of bacteria on the teeth. The second series indicates that the noon meal had the effect of doubling the total number of bacteria on the teeth. In the specimens taken before brushing and after the meal, the number of cultivable bacteria was higher than in those taken after the brushing and before the meal, respectively. The number of colonies on the agar-plates was just as large as that on the sugar-containing medium. The ratio between microscope- and plate-counts is as low as 4:1 and 7:1, respectively.

These results appear to be the first quantitative counts of a comparative character that have ever been made on bacteria of the teeth. In this connection we note the role that might be played by the small quantities of tooth-scrapings and food-rests introduced into the medium and the stimulating effect they might have on the growth of these organisms. This, with many other suggestions from these findings, will receive due attention as these studies develop.

QUANTITATIVE RESULTS: CARIOUS TEETH. The specimens taken directly from carious teeth cannot be readily divided into groups, as the affections insensibly grade into one another. Four divisions have been made as outlined above, but the demarcation is not sharp. "Overlapping" conditions are represented by four of the specimens: two that might be classed with Group 7 and two with Group 9. In these cases the pulp is only slightly involved or not at all, while the bacteriological picture consists of a composite of the types of organisms in both the second and last stages of decay. In the discussion of the frequency and abundance of types, these four specimens are classed together as Group 8.

TABLE IV.—DATA PERTAINING TO TEETH IN THE SAME INDIVIDUALS BEFORE AND AFTER THE USUAL MORNING BRUSHINGS.

| No. of Specimen | Time when specimen was taken | Individual from whom specimen was taken | Microscope-count No. per mg. | Plate-count. No. per mg. | | | |
|-----------------|------------------------------|---|------------------------------|--------------------------|------------|------------|-----------|
| | | | | Aerobic | | Anerobic | |
| | | | | Agar | Gl.-agar | Krumwiede | Jar |
| 3 | Before brushing | K. | 65,000,000 | 10,000,000 | 7,500,000 | 8,000,000 | ..... |
| 17 | After brushing | K. | 15,000,000 | 350,000 | 430,000 | 2,000,000 | ..... |
| 16 | Before brushing | Kr. | 70,000,000 | 4,200,000 | 2,300,000 | 1,700,000 | 1,030,000 |
| 5 | After brushing | Kr. | 17,500,000 | 750,000 | 500,000 | ..... | 750,000 |
| 18 | Before brushing | W. | 70,000,000 | 18,500,000 | 12,500,000 | 11,400,000 | 8,000,000 |
| 1 | After brushing | W. | ..... | 2,300,000 | 6,000,000 | 2,000,000 | ..... |

TABLE V.—DATA PERTAINING TO TEETH IN THE SAME INDIVIDUALS BEFORE AND AFTER NOON MEALS.

| No. of specimen | Time when specimen was taken | Individual from whom specimen was taken | Microscope-count No. per mg. | Plate-count. No. per mg. | | | |
|-----------------|------------------------------|---|------------------------------|--------------------------|-----------|-----------|-----------|
| | | | | Aerobic | | Anerobic | |
| | | | | Agar | Gl.-agar | Krumwiede | Jar |
| 12 | Before the meal | H. | 40,000,000 | 160,000 | 200,000 | 140,000 | 140,000 |
| 21 | After the meal | H. | 100,000,000 | 7,000,000 | 4,500,000 | 6,000,000 | 8,300,000 |
| 13 | Before the meal | B. | 16,500,000 | 133,000 | 155,000 | 55,000 | 255,000 |
| 20 | After the meal | B. | 37,500,000 | 2,500,000 | 2,650,000 | 2,500,000 | 3,000,000 |
| 15 | Before the meal | P. | 23,000,000 | 80,000 | 100,000 | 530,000 | 440,000 |
| 19 | After the meal | P. | 65,000,000 | 8,000,000 | 1,000,000 | 800,000 | 1,200,000 |

Group 6. In this group there were three cases, in each of which the enamel only was affected. The dental deposit was very slight and the amount of scrapings in each instance was only 0.5 mgm. The striking results here are the abnormally high microscope-count, between 450,000,000 and 600,000,000 per mgm. and the comparatively high plate-count. It is noteworthy

TABLE VI.—DATA PERTAINING TO CARIES OF ENAMEL ONLY.
PRIMARY STAGE OF DECAY.

| No. of Specimen | Source of specimen | Condition of tooth, mouth, gums, etc. | Microscope-count No. per mg. | Plate-count. No. per mg. | | | |
|-----------------|---------------------|---|---------------------------------|--------------------------|------------|------------|------------|
| | | | | Aerobic | | Anerobic | |
| | | | | Agar | Gl.-agar | Krumwiede | Jar |
| 32 | Upper left incisor. | Layer between dentin and enamel sensitive. Tooth had been filled; decay continued. | 630,000,000 | 1,750,000 | 2,000,000 | 4,000,000 | ..... |
| 30 | ..... | Break of about one mm. in enamel. Teeth in good condition. Gums healthy. | 500,000,000 | 2,000,000 | 4,300,000 | 16,800,000 | 44,000,000 |
| 28 | ..... | Enamel only affected. Teeth and gums in poor condition. Abscess about adjacent tooth. | 460,000,000 | *20,400,000 | 21,200,000 | 14,000,000 | 60,000,000 |

* The enormous increase in this count is undoubtedly due to the abscess in the adjacent tooth.

that the ratio here rises to 25:1, a figure far higher than the average for the normal samples, and that the plate-count for the semi-anaerobic conditions obtainable in the jar is appreciably higher than for any of the other plates. Another interesting feature that distinguishes this group, as well as Group 7, from the normal teeth is the occurrence in great abundance of certain types of bacteria that were present only rarely or not at all on the normal teeth. These types will be discussed, at length, later. The detailed results are tabulated in Table VI.

TABLE VII.—DATA PERTAINING TO CARIES OF ENAMEL AND DENTIN.
SECOND STAGE OF DECAY.

| No. of specimen | Source of specimen; condition of tooth | Condition of mouth, gums, etc. | Microscope-count No. per mg. | Plate-count. No. per mg. | | | |
|-----------------|---|---|------------------------------|--------------------------|-----------|-----------|------------|
| | | | | Aerobic | | Anerobic | |
| | | | | Agar | Gl-agar | Krumwiede | Jar |
| 38 | Second lower bicuspid. Proximal cavity involving dentin. | ..... |  |  |  |  |  |
| 39 | Upper left second bicuspid. | Mouth poorly cared for. | 93,500,000 | 270,000 | 1,070,000 | 730,000 | 130,000 |
| 40 | First lower right molar; enamel and dentin involved. | Mouth and teeth in poor condition. | 142,000,000 | 600,000 | 1,200,000 | 600,000 | 280,000 |
| 31 | Upper right incisor. Enamel and dentin involved; dentin much decayed. | Gums healthy. Many similar cavities in teeth. | 500,000,000 | 1,900,000 | 1,500,000 | 1,800,000 | 2,200,000 |
| 29 | Upper right incisor. Enamel and dentin affected; pulp not involved. | Much calculus and many erosions. Teeth neglected. | 300,000,000 | 1,450,000 | 9,600,000 | 3,700,000 | 22,000,000 |

Group 7. This group (Table VII) consists of five cases of caries in which both the enamel and dentin were involved. On the whole, this group is characterized by relatively larger amounts of deposit, mostly debris, food particles, etc., and lower microscope- and plate-counts than Group 6. This is probably due to several factors, among which the accumulation of waste is perhaps of some significance in suppressing the growth of the bacteria. The large amount of debris undoubtedly serves, also, as a sort of diluent for the bacteria, which *in toto* equal those for the first stage of caries, where the scrapings consisted almost entirely of bacteria. That this is the case is seen when one multiplies the figures for the total weight of the material obtained, by those for the count per mgm. This idea is also confirmed by the results obtained for the specimens mentioned in Table IX, which consisted almost entirely of debris and food particles. Otherwise there is no marked difference between these cases and those in which the enamel only was involved. The prevalent types of organisms were essentially the same in both groups except in two cases, which apparently represented the transitional types mentioned above. (Group 8.)

Group 9. This group includes all cases in which decay has progressed sufficiently to involve the pulp. Altogether there were 9 samples, 2 of which form a sort of transitional class showing some of the characteristics of the previous groups and some of this one. (Group 8). These two gave the high microscope- and plate-counts, the relatively higher counts on the glucose-agar and on the serum-agar plates kept under anerobic conditions, and types of organisms associated with the decay of enamel and dentin as well as of the pulp. These respective types are, furthermore, less abundant in these cases than for either of the other phases of decay.

Group 9 as a whole is characterized by a moderately high microscope-count and a relatively higher count on the anerobic plates generally, associated with gas production and a putrid odor. (See Table VIII). Further distinguishing characteristics of this group, which show that it is entirely distinct from those related to the primary stages of tooth-decay, are the occurrence in great abundance in all cases of anerobic putrefying organ-

isms, and the practically complete absence of certain types that are distinctive of decay of enamel and dentin. These organisms, their abundance and frequency of occurrence, will be discussed more fully later; attention is called here merely to the correlation between the clinical picture, the total counts and the specific types of organisms found.

TABLE VIII.—DATA PERTAINING TO PUTRESCENT PULP.

THIRD AND FOURTH STAGES OF DECAY.

| No. of specimen | Source of specimen | Condition of tooth, mouth, gums, etc. | Microscope-count No. per mg. | Plate-count. No. per mg. | | | |
|-----------------|--|---|---------------------------------|--------------------------|-----------|-----------|-----------|
| | | | | Aerobic | | Anerobic | |
| | | | | Agar | Gl.-agar | Krumwiede | Jar |
| 8 | First lower left molar, pulp putrescent. | Mouth "clean." Teeth in good condition. Tooth affected was filled about two months ago. | | | | | |
| 22 | Lower left third molar, pulp putrescent. | Much calculus. Gingivitis. Pus at gum line. | 80,000,000 | 880,000 | 1,740,000 | 1,700,000 | 1,120,000 |
| 23 | Lower incisor, putrescent pulp. | Pyorrhoea; much recession of gums. | 36,500,000 | 6,350,000 | 1,810,000 | 2,000,000 | 2,000,000 |
| 24 | First upper right molar. Deep cavity, putrescent pulp. | ..... | 41,000,000 | 240,000 | 1,430,000 | 5,700,000 | ..... |
| 25 | Upper left incisor. Pulp putrescent. | Pericementitis. | 23,500,000 | 1,500,000 | 360,000 | 1,550,000 | 900,000 |
| | | | 85,000,000 | 155,000 | 125,000 | ..... | ..... |

TABLE VIII (*con.*).—DATA PERTAINING TO PUTRESCENT PULP.
THIRD AND FOURTH STAGES OF DECAY.

| No. of specimen | Source of specimen | Condition of tooth, mouth, gums, etc. | Microscope-count No. per mg. | Plate-count. No. per mg. | | | |
|-----------------|--|--|---------------------------------|--------------------------|-----------|------------|------------|
| | | | | Aerobic | | Anerobic | |
| | | | | Agar | Gl.-agar | Krumwiede | Jar |
| 26 | Last left molar. Pulp partly decayed. | Gingival cavity. | 110,000,000 | 150,000 | 500,000 | 24,000,000 | 260,000 |
| 36 | First lower right molar. Pulp chamber exposed; putrescent. | Teeth in bad condition. Other cavities in mouth. | 40,000,000 | 60,000 | 250,000 | 1,000,000 | 750,000 |
| 27 | Upper right incisor. Dentin much decayed; pulp involved. | Marked erosion and calculus. | 61,500,000 | 1,600,000 | 2,800,000 | 2,400,000 | 11,000,000 |
| 34 | First lower left molar. Third stage. | Gums healthy. Much bridge-work. Mouth "clean." | 41,000,000 | 500,000 | 500,000 | 1,750,000 | ..... |

Still another sub-group of three samples is included here, representing the material deposited on the surface and in the upper part of the cavity of putrescent caries, which consists of a considerable amount of debris, food rests, etc. The microscope-count for these specimens is comparatively low, the plate-counts relatively high, and the amount of accumulated deposit much greater than usual. The types of bacteria for this sub-group are also characteristic, consisting almost entirely of cocci. The data are shown in Table IX.

QUALITATIVE RESULTS. It was a comparatively simple matter, once the method of sampling was defined, to pour plates and

TABLE IX.—DATA PERTAINING TO MATERIAL TAKEN FROM SUPERFICIAL LAYER IN DECAY OF EXPOSED PULP.

| No. of specimen | Source of specimen | Condition of mouth | Microscope-count No. per mg. | Plate-count. No. per mg. | | | |
|-----------------|---|--|---------------------------------|--------------------------|-----------|------------|---------|
| | | | | Aerobic | | Anerobic | |
| | | | | Agar | Gl.-agar | Krumwiede | Jar |
| 33 | Second bicuspid. Pulp chamber affected down to root-canal. Material taken from top. | Much calculus and stain. Tooth pyorrheal. | 16,000,000 | 2,240,000 | 4,160,000 | 2,560,000 | ..... |
| 35 | Temporary molar; fourth stage. Pulp exposed. | Mouth fairly clean. Gums healthy. | 70,000,000 | 1,800,000 | 7,300,000 | 10,200,000 | ..... |
| 37 | Upper layer of material on first molar. Pulp putrescent; exposed. | Teeth in bad condition. Other cavities in mouth. | 25,600,000 | 410,000 | 240,000 | 500,000 | 250,000 |

make counts. The important part of the problem was, however, to determine the types of bacteria found on normal and decayed teeth, respectively. This was not quite so simple, because of the great complexity and bewildering pleomorphic character of the oral flora. The first difficulty was greatly reduced by selecting only those types which were sufficiently abundant to appear on plates containing a dilution of 1:1000 or over. The second problem was solved by subjecting isolated types to somewhat thorough biochemical tests.

The inadequacy of purely morphological grouping is nowhere more strikingly illustrated than in the case of some of the bacteria found in the mouth. Bacteria as a class have evolved so little along morphological lines that it is impossible to differentiate members of the same genus on a merely physical basis. Bacteriologists, therefore, resort to the more delicate criteria of protoplasmic constitution and physiological activity, in which directions remarkable differentiations exist. Bacteria generally

have evolved in certain main directions: thus, one group has acquired marked carbohydrate-splitting properties, another has developed the property of digesting various protein substances, while still another possesses both powers. The streptococci belong to the division showing but little tendency to proteolysis, the aerobic spore-formers belong to the proteolytic group, while the *B. proteus* and the anerobic spore-formers are capable of digesting both carbohydrates and proteins.

In a study of this nature it is necessary, therefore, to ascertain the carbohydrate and nitrogenous metabolism of the various types. The former is ordinarily determined by observing gas and acid production in media containing various carbohydrates, the latter by testing for indol and ammonia, end-products of nitrogenous metabolism, in a sugar-free peptone-mixture. The proteolytic activities of bacteria may be further studied by observing their action on gelatin, casein or serum, the presence or absence of protease being indicated by presence or absence of liquefaction. A further index of the metabolic activities of bacteria is their reducing action on stable compounds such as sodium or potassium nitrate. These tests help to differentiate the various types of bacteria into comparatively well defined groups.

Since the spirochetes and fusiform bacilli have been studied rather extensively, and also necessitate a very special and particularly difficult technique for their isolation, it was decided to disregard these organisms temporarily and devote our chief attention to other forms that have not been investigated so thoroughly. So much confusion exists regarding the so-called *Leptothriceæ*, and the anerobic flora, that it was desirable to pay special attention to these forms. It is only by clearing up obscure points that one can hope to throw new light on any subject. This plan was not adopted, however, to the entire exclusion of other significant types. An attempt was made to include practically all the prevailing cultivable types as they occurred on the plates under examination. To this end proportionate numbers of characteristic colonies were picked from each set of plates. Those taken from the aerobic plates were streaked on glucose-agar while those from the anerobic plates were inoculated in glucose-agar stabs. These cultures were then tested on various culture media.

TABLE X.—AVERAGE VALUES IN THE COUNTS FOR THE DIFFERENT GROUPS (SEE CHARTS A AND B) OF TEETH REFERRED TO IN TABLES I-IX.

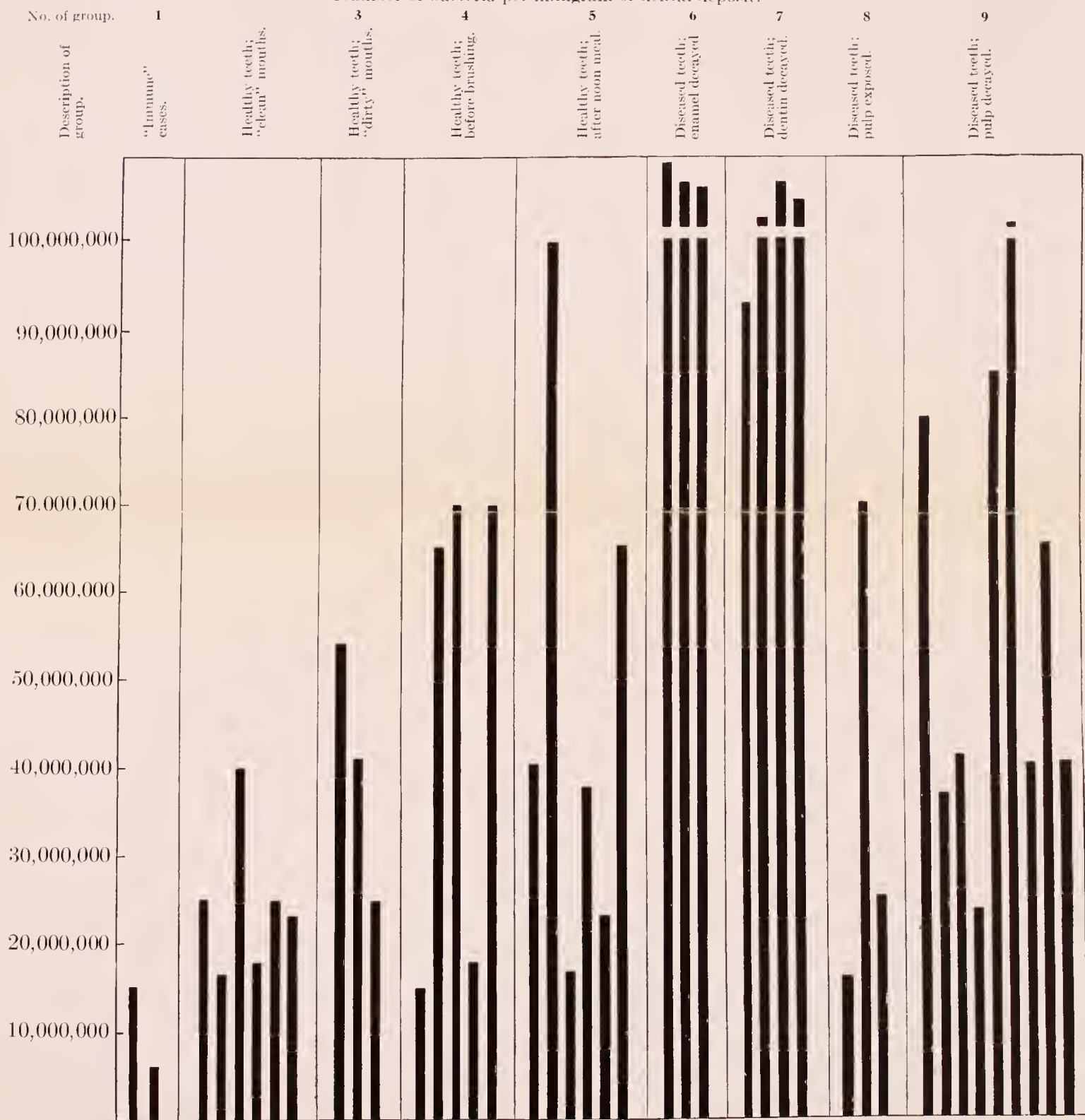
| Group | No. of cases in each group | Description of Group | Microscope-count, Average No. per mgn. | Plate-count. No. per mgn. | | | | Ratio * between microscope- and plate-counts |
|-------|----------------------------|--|--|---------------------------|--------------|------------|------------|--|
| | | | | Aerobic | | Anaerobic | | |
| | | | | Agar | Glucose-agar | Krumwiede | Jar | |
| 1 | 2 | Immune cases..... | | | | | | 6:1 |
| 2 | 8 | Healthy teeth; "clean" mouths..... | 10,500,000 | 275,000 | 550,000 | 1,320,000 | 300,000 | |
| 3 | 2 | Healthy teeth; "dirty" mouths..... | 24,500,000 | 650,000 | 990,000 | 835,000 | 435,000 | 13:1 |
| (3,a) | 2 | Healthy teeth; "dirty" mouths; tobacco chewers.. | 47,000,000 | 1,380,000 | 1,860,000 | 2,050,000 | 1,000,000 | 12:1 |
| 4 | 3 | Healthy teeth, before and after brushing..... | 25,000,000 | 245,000 | 335,000 | 325,000 | 140,000 | 38:1 |
| 5 | 3 | Healthy teeth, before and after meal..... | 68,000,000 | 10,900,000 | 7,400,000 | 7,370,000 | 4,520,000 | 4:1 |
| 6 | 3 | Primary caries..... | 16,250,000 | 1,700,000 | 2,300,000 | 2,000,000 | 750,000 | 4:1 |
| 7 | 5 | Caries; enamel and dentin.. | 26,500,000 | 124,000 | 152,000 | 342,000 | 278,000 | 60:1 |
| (9,a) | 3 | Pulp exposed; superficial layer..... | 67,500,000 | 5,830,000 | 2,720,000 | 3,100,000 | 4,160,000 | 7:1 |
| 9 | 9 | Pulp putrescent, deep layer. 3rd and 4th stage of decay. | 530,000,000 | 8,050,000 | 9,200,000 | 11,600,000 | 54,000,000 | 25:1† |
| | | | 258,900,000 | 1,380,000 | 3,130,000 | 1,750,000 | 5,170,000 | 31:1 |
| | | | 37,200,000 | 1,480,000 | 3,900,000 | 4,420,000 | ..... | 45:1 |
| | | | 57,670,000 | 1,270,000 | 1,060,000 | 5,010,000 | 2,670,000 | 9:1 |

* In obtaining the ratio the plate-count used is the sum of the aerobic and anaerobic counts on the glucose-agar plates.

† If the jar-count were used the ratio would be 9:1, but this jar-count seems aberrant and the Krumwiede plate-count is used, as in all the other cases.

CHART A (SEE TABLE X)

Average values in the bacterial, total, *microscope*-counts for the nine different groups of teeth referred to in Tables I-IX.
Number of bacteria per milligram of dental deposit.



THE LENGTH OF EACH VERTICAL BAR CORRESPONDS TO THE NUMBER OF BACTERIA PER MILLIGRAM OF DENTAL DEPOSIT, AS ASCERTAINED FOR A SINGLE SPECIMEN

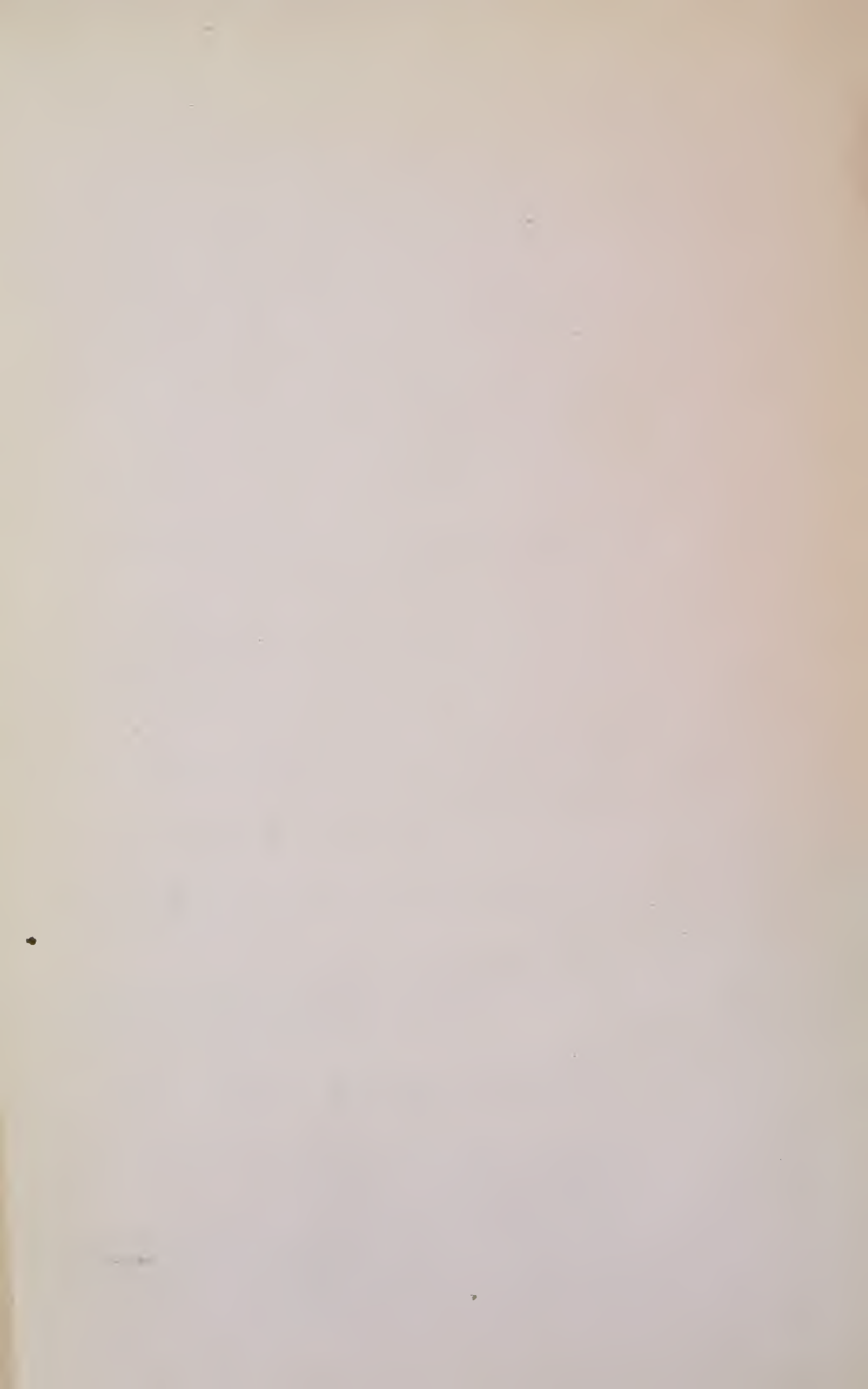
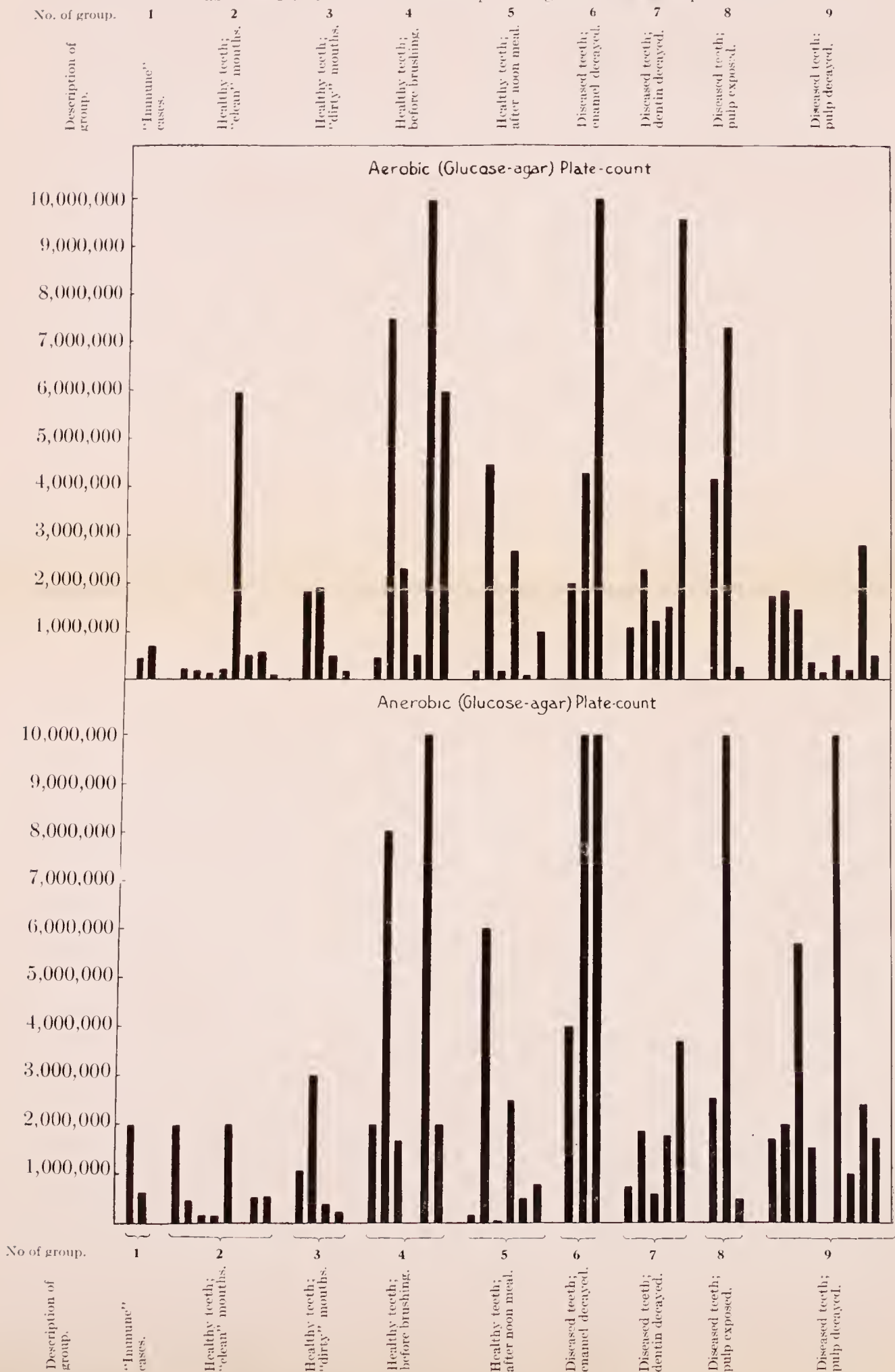


CHART B (SEE TABLE X)

Average values in the bacterial, total, plate-counts for the nine different groups of teeth referred to in Tables I-IX. Number of bacteria per milligram of dental deposit.



THE LENGTH OF EACH VERTICAL BAR CORRESPONDS TO THE NUMBER OF BACTERIA PER MILLI-GRAM OF DENTAL DEPOSIT, AS ASCERTAINED FOR A SINGLE SPECIMEN

The tests to which the cultures were subjected were the following:

- A. Morphology and chromology (Gram-stain)
- B. Motility
- C. Spore-formation
- D. Aerobiosis
- E. Fermentation of carbohydrates
- F. Action on milk
- G. Liquefaction of gelatin
- H. Action on peptone:
 - a. Indol production
 - b. Ammonia production
- I. Reduction of nitrates

A. *Morphological* examinations of the various organisms were made by staining with gentian violet and by Gram's method. The latter test separated the different strains into two main divisions: those that retained the dye (Gram-positive types) and those that did not retain it (Gram-negative types). These tests also divided the bacteria into large families and genera, *e.g.*, *cocci*: streptococci, diplococci, and staphylococci; *bacilli*: large and small rods, spore-bearing or non-spore-bearing; *trichomycetes*: branched or non-branched threads or short, pleomorphic and long non-pleomorphic threads. More than such a broad sub-division cannot be obtained on a purely morphological basis, with a flora so highly variable as that of the mouth. Some of the types of the trichomycetes are so puzzling that under certain conditions they would readily pass as cocci, under others as diphtheroids and under still others as threads. It is no wonder that Vincentini at one time claimed that these organisms were the progenitors of all the other members of the oral flora. There can be no doubt that they contribute greatly to the marked variability of the microscopic appearance of that flora. Another type, a bacillus, varies in morphology from a short, thin rod of about 2 to 3 μ in length, to long rods and very long threads. Some of these were replated several times to determine whether they were pure cultures.

With these facts on the pleomorphic character of oral bacteria in mind, we can readily see how little reliance may be placed

on studies based solely on morphological examinations; and how much significance may be attached to named species seen only in pictures. Schaudin laid down the rule that the only proper criterion for the classification of protozoa is a determination of their life cycles. A good precept for the study of bacteria would be: The only criterion for the differentiation of bacterial types is a determination of their *biochemical properties*. Only such forms can be spoken of with definiteness.

B. *Motility* was determined in the usual way, by direct microscopic observation.

C. *Spore-formation* was determined by staining and, where doubtful, by the heating test. The culture to be tested was heated, to 80° C. for 10 minutes. If, on sub-culturing, growth was obtained the organism was considered capable of forming spores.

D. *Aerobiosis*. A simple method for determining aerobiosis is to make a stab in a deep tube of glucose-agar containing only $\frac{1}{2}$ per cent. of agar. Obligate aerobes grow only on the surface and about $\frac{1}{4}$ inch below; facultative anerobes grow down the full line of the stab; while obligate anerobes grow along the line of the stab up to about $\frac{1}{2}$ inch from the top.

E. The *fermentative properties* of the bacteria were tested by inoculating the organisms into a medium consisting of sugar-free meat-infusion standard broth containing 1% of a particular carbohydrate. These cultures were then incubated for 3-5 days and the yield of acid determined by titrating with a $n/20$ solution of sodium hydroxid, with phenolphthalein as the indicator. A control un-inoculated tube was also titrated and the difference in acidity between this and the culture fluid gave the value for the acid produced by the bacteria. For most of the organisms the three carbohydrates, glucose, lactose and sucrose, were used. For the streptococci, mannite, raffinose, salicin and inulin were also used. In some cases maltose was included among the test carbohydrates.

F. The *action on milk* was determined in the usual way by inoculating skimmed sterile milk with the culture to be tested. One c.c. of a 1% solution of azolitmin was added to each 10 c.c. of milk to indicate acidity or alkalinity. Acid-production, clot-formation and digestion were noted. Not all the cultures were

subjected to this test. On the whole very little information was obtained from it that could not be gotten from the other tests.

G. *Liquefaction of gelatin* was determined by inoculating the surface of straight gelatin-tubes 1 cm. in diameter, containing 7-8 c.c. of gelatin, and measuring the number of cubic centimeters liquefied at the end of 20 days.

H. *Action on peptone*. (a) The production of ammonia was tested by the Nessler method; (b) indol production was determined with the Ehrlich reagent (*p*-di-methyl amino-benzaldehyde and hydrochloric acid.)

I. *Nitrate reduction* was ascertained by testing for nitrites, in a five-day culture, with naphthylamin hydrochlorid and sulphanilic acid.

The extent of this part of the investigation (A-I) may be surmised from the fact that over 600 strains were isolated, of which about 400 were studied in some detail. A number of the more delicate types not readily adaptable to artificial media died soon after the initial cultivation and only a few of their characters could be ascertained. Others became adapted to artificial existence and were studied more extensively. A detailed characterization of these types will be given later. At this point mention will be made only of some of their general characteristics in order to bring out their relationships to one another, and their occurrence and predominance under certain conditions.

5. **The Frequency of Occurrence and the Abundance of the Various Types of Bacteria under the Different Conditions Studied.**—GENERAL FACTS. From the various investigations summarized in the second paper of this series it was apparent that no definite statement could be made regarding the relative abundance of certain types of bacteria in the normal mouth. On the whole, however, the authors that were quoted agreed on the fact that the cocci are the predominant types, and are always present even in suckling infants. There is also general agreement that thread-forms were found in the mouths of all or almost all the individuals examined, though we can gather little regarding their abundance. Pickerill's and Oshima's results are probably the most reliable, but both are based on smear-examinations.

Tables XI, XII, XIII and XIV indicate the frequency of

occurrence and abundance of the different types in the various groups of cases examined in our own work.

In Tables XI and XII the results were arranged to show the number and percentage of total cases, as well as the number and percentage of cases in each group, in which the different types of bacteria were found, with the object of indicating the frequency with which these types occur on human teeth. In a general way, some of the results agree with those of previous workers in this field. The streptococci, for instance, were found to be present in all the cases examined. Diplococci of both the Gram-positive and Gram-negative varieties were isolated in a great majority of cases, the Gram-negative type appearing to be specially characteristic, though it has not heretofore been described by workers in this field. Staphylococci do not occur as frequently as the other cocci, but appear more regularly in small numbers on normal than on carious teeth. The staphylococcus most frequently isolated is of the albococcus variety, the aurococcus having been isolated only in one or two cases. This finding accords with those of Goadby and others in this relation. The cocci as a family may therefore be considered as regular inhabitants of the oral cavity and are generally more frequently found under normal than under pathological conditions.

Interesting and striking results were noted among the members of the rod-shaped bacteria. These were divided conveniently into three large groups: the aerobic spore-formers, the anerobic spore-formers and the non-spore-forming bacilli. The aerobic spore-bearing rods occur with comparative regularity in small numbers on both normal and decayed teeth. The anerobic spore-bearers were isolated only rarely (twice) from either healthy teeth or those in the first or second stages of decay. They were found in all the cases of pulp-decay and in three out of four cases where the pulp was exposed though not decayed.

Also significant, though not quite as striking, is the frequency with which the non-spore-bearing bacilli occur in the different groups. These forms were found irregularly on normal teeth, and were present in all cases in which decay had set in. It is quite likely that had it been possible to obtain, for the study of the flora of *normal* teeth, cases in which there was no abnormal

TABLE XIII.—PERCENTAGE OF EACH TYPE OF ISOLATED BACTERIA IN EACH SPECIMEN EXAMINED.

| No. of Specimen | Total number of cultures isolated | Percentage of Gram-positive bacteria | Cocci | | | Bacilli | | | Trichomycetes | | | |
|-----------------|-----------------------------------|--------------------------------------|---------------|---------------|---------------|----------------|-----------------------|-------------------------|-------------------|-------------------|-----------------------|------|
| | | | Strepto-cocci | Diplococci | | Staphylo-cocci | Aerobic spore-formers | Anaerobic spore-formers | Non-spore formers | Branching threads | Non-branching threads | |
| | | | | Gram-positive | Gram-negative | | | | | | Short | Long |
| | | | | | | | | | | | | |
| 1 | 10 | 60 | 70 | 0 | 10 | 10 | 0 | 0 | 0 | 0 | 10 | 0 |
| 2 | 12 | 50 | 33 | 17 | 8.5 | 8.5 | 17 | 0 | 0 | 0 | 17 | 0 |
| 3 | 7 | 57 | 43 | 0 | 14 | 29 | 0 | 0 | 0 | 0 | 14 | 0 |
| 4 | 16 | 75 | 44 | 19 | 6 | 19 | 12 | 0 | 0 | 0 | 0 | 0 |
| 5 | 20 | 60 | 45 | 15 | 10 | 10 | 10 | 0 | 5 | 5 | 0 | 0 |
| 6 | 20 | 60 | 45 | 0 | 15 | 5 | 10 | 0 | 0 | 0 | 5 | 0 |
| 7 | 27 | 56 | 37 | 11 | 18 | 4 | 11 | 0 | 4 | 4 | 7 | 4 |
| 8 | 19 | 64 | 26 | 31 | 16 | 5 | 5 | 11 | 5 | 0 | 0 | 0 |
| 9 | 20 | 62 | 45 | 10 | 10 | 5 | 5 | 0 | 5 | 0 | 20 | 0 |
| 10 | 20 | 50 | 30 | 15 | 15 | 5 | 20 | 0 | 5 | 0 | 10 | 0 |
| 11 | 11 | 50 | 18 | 19 | 27 | 0 | 18 | 0 | 9 | 0 | 18 | 0 |
| 12 | 10 | 57 | 30 | 30 | 20 | 10 | 0 | 0 | 0 | 0 | 10 | 0 |
| 13 | 16 | 71 | 44 | 12 | 6 | 6 | 0 | 0 | 19 | 0 | 12 | 0 |
| 14 | 16 | 63 | 25 | 13 | 13 | 31 | 6 | 0 | 6 | 6 | 0 | 0 |
| 15 | 18 | 64 | 44 | 17 | 17 | 0 | 17 | 5 | 0 | 0 | 0 | 0 |
| 16 | 20 | 60 | 20 | 5 | 25 | 0 | 10 | 0 | 20 | 5 | 15 | 0 |
| 17 | 22 | 50 | 32 | 5 | 27 | 9 | 9 | 0 | 9 | 0 | 9 | 0 |
| 18 | 15 | 55 | 27 | 7 | 20 | 6 | 13 | 0 | 6 | 7 | 13 | 0 |
| 19 | 20 | 70 | 30 | 10 | 10 | 10 | 10 | 5 | 0 | 0 | 20 | 5 |
| 20 | 14 | 66 | 43 | 0 | 7 | 14 | 7 | 0 | 7 | 0 | 14 | 0 |
| 21 | 16 | 55 | 38 | 12 | 25 | 0 | 6 | 0 | 0 | 0 | 13 | 0 |
| 22 | 16 | 50 | 25 | 19 | 12 | 0 | 0 | 19 | 25 | 0 | 0 | 0 |
| 23 | 18 | 38 | 17 | 11 | 11 | 11 | 11 | 17 | 22 | 0 | 0 | 0 |
| 24 | 18 | 60 | 11 | 6 | 22 | 0 | 0 | 22 | 39 | 0 | 0 | 0 |
| 25 | 8 | 50 | 0 | 12 | 37 | 0 | 0 | 13 | 38 | 0 | 0 | 0 |
| 26 | 16 | 40 | 31 | 12 | 0 | 0 | 6 | 25 | 12 | 0 | 6 | 0 |
| 27 | 20 | 70 | 25 | 0 | 10 | 0 | 5 | 10 | 25 | 0 | 20 | 5 |
| 28 | 20 | 50 | 30 | 0 | 10 | 0 | 5 | 0 | 25 | 5 | 15 | 10 |
| 29 | 20 | 63 | 20 | 10 | 10 | 10 | 10 | 5 | 35 | 0 | 0 | 0 |

1 yeast

TABLE XIV (SEE CHART D).—PERCENTAGE OF EACH TYPE OF ISOLATED BACTERIA FOR EACH OF THE NINE GROUPS OF CASES.

| No. of group | No. of cases | Total no. of cultures isolated | Description of group | Cocci | | | | Bacilli | | | Trichomycetes | | |
|--------------|--------------|--------------------------------|---------------------------------|---------------|---------------|---------------|----------------|---------------|----------|-------------------|-------------------|-----------------------|------|
| | | | | Strepto-cocci | Diplococci | | Staphylo-cocci | Spore-formers | | Non-spore-formers | Branching threads | Non-branching threads | |
| | | | | | Gram-positive | Gram-negative | | Aerobes | Anerobes | | | Short | Long |
| 1 | 2 | 27 | Immune cases... | 44 | 7 | 11 | 11 | 4 | 0 | 4 | 0 | 15 | 0 |
| 2 | 8 | 113 | Healthy teeth; "clean" mouths | 39 | 14 | 13 | 10 | 9 | 1 | 5 | 2 | 7 | 0 |
| 3 | 4 | 83 | Healthy teeth; "dirty" mouths | 43 | 11 | 15 | 7 | 13 | 0 | 2 | 2 | 6 | 2 |
| 4 | 3 | 57 | Healthy teeth; before brushing. | 26 | 5 | 25 | 5 | 10 | 0 | 12 | 4 | 12 | 0 |
| 5 | 3 | 50 | Healthy teeth; after meal.... | 36 | 8 | 14 | 8 | 10 | 2 | 4 | 0 | 16 | 2 |
| 6 | 3 | 60 | Primary caries... | 20 | 13 | 15 | 5 | 7 | 0 | 20 | 3 | 16 | 10 |
| 7 | 4 | 41 | Caries; enamel and dentin.... | 22 | 7 | 5 | 2 | 2 | 0 | 27 | 5 | 22 | 7 |
| 8 | 4 | 71 | Pulp exposed.... | 27 | 4 | 8 | 4 | 7 | 5 | 28 | 0 | 11 | 4 |
| 9 | 7 | 105 | Pulp putrescent. | 21 | 15 | 14 | 3 | 4 | 17 | 23 | 0 | 2 | 0 |

| | | | | | | | | | | | | | |
|----|----|-----|----|----|----|---|----|---|---|----|----|----|----|
| 30 | 24 | 71 | 21 | 9 | 17 | 8 | 8 | 0 | 0 | 12 | 4 | 13 | 8 |
| 31 | 16 | 57 | 44 | 6 | 13 | 0 | 0 | 6 | 6 | 12 | 0 | 19 | 0 |
| 32 | 16 | 88 | 6 | 0 | 19 | 6 | 6 | 0 | 0 | 25 | 0 | 25 | 13 |
| 33 | 9 | 60 | 22 | 11 | 33 | 7 | 0 | 0 | 0 | 34 | 0 | 0 | 0 |
| 34 | 15 | 70 | 20 | 0 | 0 | 0 | 13 | 0 | 0 | 40 | 0 | 7 | 13 |
| 35 | 13 | 71 | 23 | 0 | 15 | 0 | 15 | 0 | 0 | 47 | 0 | 0 | 0 |
| 36 | 13 | 73 | 23 | 15 | 7 | 0 | 7 | 7 | 7 | 30 | 0 | 7 | 0 |
| 37 | 16 | 91 | 25 | 13 | 12 | 0 | 0 | 0 | 0 | 25 | 0 | 25 | 0 |
| 38 | 10 | 100 | 20 | 0 | 0 | 0 | 10 | 0 | 0 | 20 | 10 | 30 | 10 |
| 39 | 16 | 86 | 12 | 13 | 6 | 0 | 0 | 0 | 0 | 37 | 0 | 25 | 6 |
| 40 | 15 | 79 | 33 | 7 | 7 | 6 | 0 | 0 | 0 | 20 | 7 | 13 | 7 |

condition in any other part of the mouth, the results for such cases would have been even more striking in this connection. The significance and possible interpretation of these results will be discussed more fully later, this section being devoted primarily to the presentation of the actual data.

The occurrence of the trichomycetes is also suggestive. Branched forms were found regularly in the first and second stages of decay and occasionally in the normal cases. The short threads were found under all conditions, though more frequently in the early stages of decay, on the unbrushed teeth and after the meal. The long threads (or what I believe are the true *Leptothrviceae*) are found only rarely, if at all, under any condition other than those of the first and second stages of caries, in which they occur in large numbers. In decay of the pulp all of these forms are absent.

On examining Tables XIII and XIV, which show in a general way the abundance of these types under different conditions, further light is obtained on the possible relationship of these types to the process of decay in its different stages. Thus, of the total number of strains isolated in Group 1, 44 per cent. were streptococci and over 70 per cent. were cocci of some sort, while only 8 per cent. were bacilli and 15 per cent trichomycetes. This general ratio is noted also in Groups 2, 3, 4 and 5, about 70 per cent. of the strains being cocci and only 30 per cent. representatives of the other two families. Anerobic bacilli are absent and non-spore-formers occur only in small numbers, the same being true of the threads.

The ratio is decidedly different for the groups representing the specimens taken from diseased teeth. The percentage of cocci drops to between 40 per cent. and 50 per cent.; that of streptococci alone from about 40 per cent. to 20 per cent., a decrease of one-half; while there is a corresponding increase in the numbers of non-spore-bearing rods and of thread forms. In Groups 6 and 7 (consisting of cases of first and second stages of decay), the thread-forms rise to about 30 per cent., an average increase of 100 per cent. to 200 per cent.; while there is proportionately an even greater increase in the non-spore-bearing bacilli. These rods belong to the Gram-positive acidific bacilli, which are facultative

anerobes and active acid-producers, fermenting both glucose and lactose with great avidity.

Group 8 is the transitional group mentioned before. The striking results here are the presence of a small percentage of anaerobic spore-formers and a drop in the percentage of thread-forms. Both the types characteristic of Groups 5 and 6 and those of Group 9, respectively, occur in this group though in decreased abundance.

Group 9 is distinguished from the others by practically complete disappearance of the thread-forms and by marked increase in the percentage of anaerobic spore-formers.

CORRELATION OF THE DATA. The results presented above, when correlated with one another, exhibit a marked coherence. This agreement is especially prominent for the diseased teeth where the division into groups is based on the clinical diagnosis of the single tooth from which the specimen was taken and not on the condition of the whole mouth, as in the case of the specimens from normal teeth. In the one case the basis is specific and definite, and less liable to wide fluctuations, while in the other the basis is more general and therefore more prone to include complicating factors that may lead to discrepancies. The general consistency of the results justifies, however, the division made, though further study will most probably lead to modifications.

On comparing the results obtained in Groups 1, 2 and 3, respectively, it is evident that the flora is generally the same in character in all of them, the streptococci and cocci as a whole predominating and occurring with greater frequency than do the other types. The prevailing flora on the *healthy* teeth, whatever the condition of the mouth may be, is approximately the same in all cases. That there is a decided difference in the environment which each individual presents for the development of these types is evidenced by the greater number of bacteria found in one group than in another. In fact, this is the only index of the existence of such a difference. That conditions in the mouth exert marked influences on the growth of oral bacteria is further shown by the large increase in the total number of bacteria during the night, and during and immediately following a meal. The general relationship of the types to one another is altered

only slightly, however, the shift being in the decrease of the cocci and the increase of the forms characterizing early stages of decay. The results of the study of bacteria of healthy teeth indicates, on the whole, that, while there is rise and fall in the total numbers of bacteria with the changing conditions in the mouth, the types of organisms and their *relative* abundance remain fairly constant.

A totally different conclusion results from a correlation of the data obtained from a study of *diseased* teeth. Here too there is a decided difference in the total numbers of bacteria present at the different stages or degrees of decay. Associated with this difference there is, however, not only a complete change in the character of the flora and the relative prevalence of types from that of the healthy teeth; but there is also a distinct difference between the types of bacteria in the early stages and those in the later periods of decay.

Primary caries may, from the enormous counts and from the changed character of the prevailing flora, be considered a specific infection in which a limited number of types (perhaps three) are concerned. Just what is the predisposing factor or which of these types is most instrumental in bringing about decay, or whether we do not deal here with a true association of types, is hard to say. The significant facts are the (a) marked increase in the acidific bacilli, some of which are capable of producing and resisting an acidity of 8 per cent. *N* acid, and the (b) accompanying numerical increase in the long and short thread-forms, which can readily attach themselves in the form of compact colonies to any surface. One type of pleomorphic short thread-forming organism, growing in comparatively large colonies, has been observed regularly to attach itself to solid glass surfaces and to the wall of the test tube in liquid cultures, while in plate colonies it was often found enclosing one or two colonies of other bacteria. This type is relatively abundant in carious teeth. The relation this organism may bear to the concentration on a small area of a large number of active acid-producing rods is suggestive to say the least.

The decrease in the number of streptococci at all stages of decay fails to support the prevailing view [Goadby, Sieberth (9),

Kantorowicz (14a), Baumgartner (3), *et al*] that they are the important agent in caries. The foregoing evidence on this point is circumstantial and does not warrant any conclusions that step beyond the limits of the facts; but it is undoubtedly stronger than any proof that has hitherto been presented in favor of recognizing the streptococci or any other organisms as the causative agents in dental decay. For the present it is clear that the early stages of caries are bacteriologically due to one and the same process, characterized by a great increase in the total number of bacteria, accompanied by a drop in the relative number of cocci, and a marked increase in the number of acidific bacilli and thread-forming organisms.

Goadby (9) has observed the presence, in almost pure cultures, of an organism, from the deep layers of dentin, closely resembling the acidific bacillus and named by him *B. necrodentalis*; but he never associated decay of enamel and dentin with this form. Leber and Rottenstein, the pioneers in this field, long ago attributed caries to what they termed "leptothrices." The lack of correlation as well as the usual abundance of streptococci resulted in focusing attention on the latter as the etiologic agents of decay.

Decay of the pulp, as noted from a correlation of the results in group 9, is a process that is different in character from decay of enamel and dentin. Associated in this process are a (a) relatively low bacterial count, a (b) drop in the relative number of cocci, similar to that found in primary decay but differing from the latter also in showing a disappearance of the thread-forms, and the (c) presence in all cases of anerobic putrefying bacilli. The acidific type persists in practically the same abundance as in the initial stages of decay.

Here again it is difficult to assign with certainty to any particular form the role of furthering pulp decay. Various authors have invoked diverse agencies to explain this phenomenon. Kantorowicz (14) ascribes the process to the action of leucocytic enzymes, whereas Goadby (9) attributes it to the proteolytic enzymes of the bacteria on the decaying surface of the tooth. Most authors agree that decay of the pulp is attributable to bacterial enzymes. There is no doubt that the anerobic spore-

formers, which possess powerful proteolytic properties and are found in decay of the pulp and under no other condition, might be the agents concerned in initiating and completing this process. Rodella (28a) was the first to call attention to this organism in connection with dental caries and went so far as to attribute to it the process of decay from start to finish. My results in this connection are so striking that the conclusion seems to be warranted, that the anerobic putrefying bacillus (*B. putrificus*) is closely related to the process of pulp decay.

6. **Description of Types.**—GENUS STREPTOCOCCUS. The classification of this group has been a bone of contention for the last 15 years. More recently Gordon (10, 11), and Andrewes and Horder (1) in England, Winslow (33), Hilliard (30), Hopkins and Lang (13), Broadhurst (5), Lyall (22), Kligler (17), and others in this country, have suggested a subdivision of this genus based largely on the fermentative action of the different strains on glucose, lactose, sucrose, salicin, mannite, raffinose and inulin. These authors agree that the organisms belonging to the type *Str. pyogenes* ferment glucose, lactose, sucrose and salicin, but not the other substances. There is also fair agreement that the *Str. salivarius* (or *Str. viridans*) ferments these four substances and also raffinose, but usually not mannite. The type fermenting mannite and not raffinose is classed as *Str. fecalis*. No particular name has yet been given to the inulin fermenters, which abound in the human mouth and, contrary to the general belief, are not pneumococci.

In this investigation 123 strains of streptococci, of which 17 gave the morphology of pneumococci, were studied in detail. The grouping of these strains is summarized in the accompanying table (XV).

The results, as shown in Table XV, correspond in a general way with those obtained by Hilliard in his study of the throat streptococci. His percentages are 16.7 per cent for the glucose-lactose-sucrose group; 7.5 per cent. for the glucose-lactose-sucrose-salicin group; 23.8 per cent. for the raffinose and 6.7 per cent. for the inulin groups, respectively. The only very marked differences are noted among the sucrose and inulin fermenters. In the former group are included, however, strains which died



Fig. 1

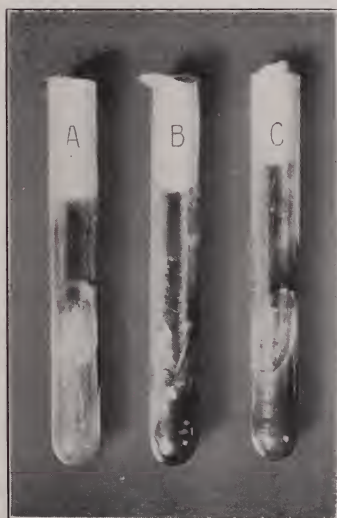


Fig. 2

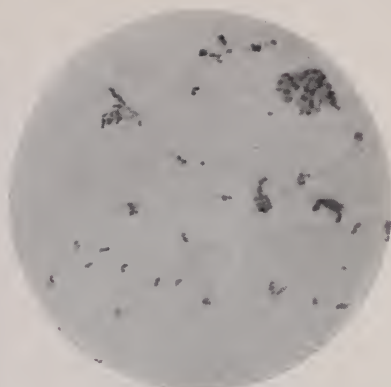


Fig. 3

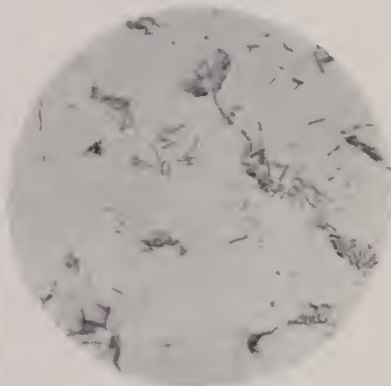


Fig. 4



Fig. 5

(See explanation on page 330)

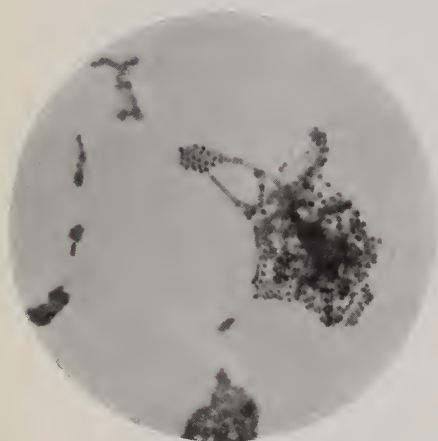


Fig. 6

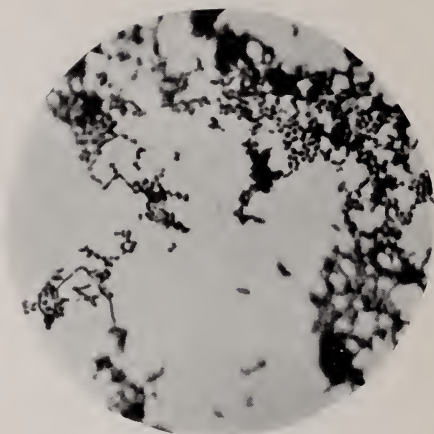


Fig. 7



Fig. 8

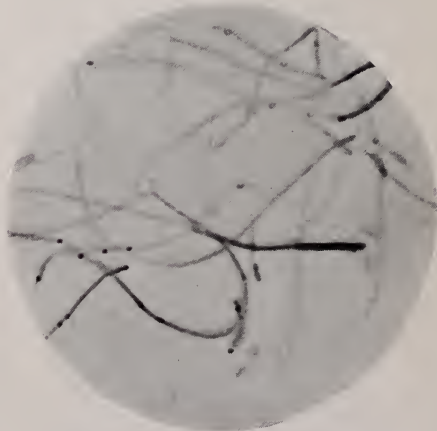


Fig. 9

(See explanation on page 330)

TABLE XV.—DATA PERTAINING TO FERMENTATIVE TYPES OF STREPTOCOCCI ISOLATED FROM DEPOSITS ON NORMAL AND DECAYED TEETH.

| Substances Fermented | Glucose, Lactose | Glucose, Lactose, Sucrose | Glucose, Lactose, Sucrose, Salicin | Glucose, Lactose, Sucrose, Salicin, Raffinose | Inulin * | Mannite ** | Positive | |
|---|------------------|---------------------------|------------------------------------|---|----------|------------|----------|------|
| | | | | | | | Gram | Milk |
| No. of strains. . . . | 13 | 36 | 11 | 40 | 27 | 6 | 94 | 63 |
| Percentage of total number of strains tested. . . | 11 | 30 | 9 | 32 | 22 | 4 | 85 | 90 |

* The mannite fermenters did not all attack salicin; 5 out of the 6 failed to ferment raffinose.

** Some of the inulin fermenters attacked raffinose, some mannite and some failed to ferment either. It was thought best to group them all as inulin fermenters.

before they could be tested on the other substances, resulting in a higher percentage; while the inulin group contains ten strains that gave a typical pneumococcus morphology. On the whole, therefore, there is little difference between the streptococci found on teeth and those in other parts of the oral cavity. Pyogenic streptococci are encountered only infrequently. Saprophytic strains, corresponding with the largest group found in milk, are quite abundant, while mannite fermenters (*fecalis* type) are rare.

The two remaining large groups are of special interest. The raffinose-fermenting type is most frequently found and is the one which usually occurs in subacute infections, such as endocarditis and rheumatism, and in pyorrhoea alveolaris (12). The inulin-fermenting types are of interest because inulin is considered diagnostic of pneumococci. A comparatively large group of mouth streptococci respond to that test.

The *cultural features of the streptococci* are the same for all types and may be briefly stated, as follows.

Morphology.—The typical organism is a spherical or somewhat oval cell occurring in chains composed of from a few to a very large number of elements. The length of the chains, as well as the size of the individual cells, varies considerably with differences in the culture medium. Division is always in one plane and packet-forms or clumps are rarely, if ever, seen. *Chromology.*—They usually stain readily with all anilin dyes, and most often retain the dye when stained by Gram's method. *Cultural characters.*

—Upon ordinary solid media, such as *agar* and *gelatin*, only a faint, veil-like growth of minute discrete colonies occurs. Addition of glucose, and especially of animal serum, is favorable to their development. *Gelatin* is not liquefied by the common types. In *broth*, a fine or coarse flocculent sediment is usually obtained. None of these characters is of value in the differentiation of the various types, though they are all distinctive for the group. The growth on blood-agar is often used to distinguish the different varieties. The pyogenic cocci usually give a clear zone of hemolysis, the pneumococci and mildly pathogenic streptococci produce green colonies, whereas the saprophytic usually do not affect the blood at all. The distinction is not, however, sharp enough to serve as a basis for a fundamental differentiation of the streptococci. The fermentation reactions have proved more reliable for that purpose; these reactions are indicated in the accompanying table (XVI).

TABLE XVI.—DATA PERTAINING TO FERMENTATION-REACTIONS OF STREPTOCOCCI ISOLATED FROM DEPOSITS ON NORMAL AND DECAYED TEETH.

| Type | No. of Strains | Glucose | Lactose | Sucrose | Salicin | Raffinose | Mannite | Inulin |
|-----------------------------|----------------|---------|---------|---------|---------|-----------|---------|--------|
| <i>Str. I.</i> | 13 | + | + | ? | .. | .. | .. | .. |
| <i>Str. anginosus</i> | 36 | + | + | + | — | — | — | — |
| <i>Str. pyogenes</i> | 11 | + | + | + | + | — | — | — |
| <i>Str. salivarius</i> | 40 | + | + | + | + | + | — | — |
| <i>Str. II.</i> | 17 | + | + | + | ± | ± | ± | + |
| <i>Str. fecalis</i> | 6 | + | + | + | + | — | + | — |
| <i>Pneumococcus</i> | 10 | + | + | + | ± | ± | ± | + |

Summarizing the results with this group, it is evident that *Str. anginosus* (Andrewes and Horder) and *Str. salivarius* (or *Str. viridans*) [Andrewes and Horder] are the two species most abundantly present in normal as well as carious teeth; and, according to Hilliard, these are also the common types in the human throat.

GENUS DIPLOCOCCUS Pneumococci were found occasionally and, because of their infrequent occurrence and their close relationship to the streptococci, were included with that genus. The

diplococci did not occur so abundantly as the streptococci, though they appeared in almost every specimen. In all, 57 strains were studied. Of these, 53 were Gram-negative and only 4 were Gram-positive. The Gram-positive varieties gave good whitish growth on agar-streaks; fermented glucose, sucrose and lactose; but failed to liquefy gelatin or produce indol. Their systematic position is not clear; they are apparently closely related to the albococci.

The Gram-negative strains fall into four divisions according to their fermentation reactions; 8 failed to ferment any of the sugars; 6 fermented glucose but did not attack lactose or sucrose; 34 fermented glucose and sucrose but not lactose; and 5 fermented the three sugars. Morphologically these strains are all more or less alike, resembling very closely the meningococcus. Culturally it is equally difficult to differentiate them. The non-fermenters are most probably *D. catarrhalis*, those fermenting all the test sugars belong to *D. crassus*, while those attacking glucose and sucrose and those attacking glucose only, are undoubtedly the chromogenic groups I and II, respectively, of Elser and Huntoon, or *Diplococcus flavus* II and I, respectively, of Lingelsheim.

The most prominent group, often abundantly present, is the one that ferments glucose and sucrose. This diplococcus is found so regularly and often, in such great numbers, that it must be considered a normal inhabitant on the teeth. It will suffice to give the cultural characters of this form as a type, since there is little difference between the various species. Besides, these organisms have been studied and described in detail by Elser and Huntoon (7), and Lingelsheim (20). The reason for repeating the description is the fact that none of these organisms has been considered a characteristic oral type. My findings indicate, however, that they are normal inhabitants of the oral cavity. Elser and Huntoon (17) have found Gram-negative cocci regularly in the respiratory passages of nursing infants and of older children.

Morphology.—The typical organism (*Diplococcus flavus*) is a small biscuit-shaped coccus occurring in twos and often in large clumps. Chains are never seen. There is some variation in size depending on the medium used. The cells are usually smaller

than the meningococcus. *Chromology*.—They stain readily with ordinary dyes, but fail to stain by Gram's method. *Cultural characters*.—In liquid cultures they show little turbidity, usually sedimenting to the bottom. The *flavus* types often color the medium a greenish yellow, especially in old cultures. On solid media they usually appear as small, raised, lustrous, whitish or yellowish colonies from 0.5 to 2 mm. in diameter. Microscopically the colonies have a regular, flat edge, the center appearing to be filled with dark coarse granules. On a slant the colonies flow together after 2-4 days, giving a lustrous yellowish to yellow growth. In older cultures this becomes brittle and crumples up readily when tested with a needle. They grow readily on agar but somewhat better on glucose- and serum-agar. Their viability on any medium is not very great. Most of them live only 1-2 weeks, especially shortly after isolation.

The only marked cultural differences among the various types is the size and color of the colonies. The *catarrhalis* colony is usually smaller than the *flavus* and greyish white in color, while the *crassus* colony is much like the *catarrhalis* but less brittle. The differentiating fermentative characters are shown in the accompanying table (XVII).

TABLE XVII.—DATA PERTAINING TO FERMENTATION-REACTIONS OF GRAM-NEGATIVE DIPLOCOCCI ISOLATED FROM DEPOSITS ON NORMAL AND DECAYED TEETH.

| Type | No. of Strains | Glucose | Lactose | Sucrose | Gelatin | Milk | Indol |
|------------------------------|----------------|---------|---------|---------|---------|------|-------|
| <i>D. crassus</i> | 6 | + | + | + | — | + | — |
| * <i>D. flavus</i> , II..... | 33 | + | — | + | — | — | — |
| * <i>D. flavus</i> , I..... | 5 | + | — | — | — | — | — |
| <i>D. catarrhalis</i> | 8 | — | — | — | — | — | — |

*A number of the *flavus* strains were also tested on maltose and found to give positive results.

STAPHYLOCOCCI. The staphylococci have been studied extensively by Gordon (11) in England, and by the Winslows (34) in this country. Gordon paid special attention to the white cocci occurring on the different parts of the body; the Winslows in-

cluded in their investigation all varieties of cocci. As a result of their work, the Winslows divide the abundantly growing staphylococci into four genera according to the type of pigment produced, and other correlated characters. The validity of this classification was confirmed by me in a previous study (18).

The cocci most often found on the teeth in the present series of observations were of the white variety, belonging to the genus *Albococcus* (Winslow). Of the 29 strains studied, 27 were albococci and only two belonged to the genus *Aurococcus*. Of the 27 white cocci, 21 were non-liquefiers; 6 liquefied gelatin, 3 of the latter reducing nitrates.

Using the classification of Gordon and Winslow, the form most frequently found on the teeth was the *Alb. candidus*, while the *Alb. pyogenes* and the *Alb. epidermidis* were represented by only 3 strains each. The two aurococci fermented glucose, lactose and sucrose but failed to liquefy gelatin. It is of interest to note that the non-liquefying cocci predominate on the teeth, and that the orange cocci are practically absent.

The characteristics of the staphylococci are well known, but for the sake of completeness the general cultural and morphological properties are briefly summarized below.

Morphology.—The cells (*Genus Albococcus*) are generally round and aggregated in irregular masses in one plane. The diameter is about 1 μ , with slight variations. *Chromology.*—They stain readily with anilin dyes and usually retain the Gram-stain. *Cultural characters.*—The white cocci give abundant grayish white to lustrous white growth on agar and gelatin. Liquefaction of gelatin, fermentation reactions and reduction of nitrates usually serve to differentiate them into specific types.

The aurococci are culturally much like the albococci except that they produce an orange pigment on various culture media, do not grow as abundantly on agar, grow much better at 37° C than at 20° C, generally reduce nitrates, and liquefy gelatin rapidly. (See Table XVIII).

GENUS BACILLUS. This genus includes a large number of bacteria of different types totally unrelated to one another except that they are all rod-shaped. I have therefore divided the organisms of this family into three large groups and will consider them under those heads.

TABLE XVIII.—DATA PERTAINING TO FERMENTATION-REACTIONS OF STAPHYLOCOCCI ISOLATED FROM DEPOSITS ON NORMAL AND DECAYED TEETH.

| Type | No. of strains | Glucose | Lactose | Sucrose | Gelatin | Indol | Nitrate | Gram |
|-----------------------------|----------------|---------|---------|---------|---------|-------|---------|------|
| <i>Alb. candidus</i> | 21 | + | + | + | — | — | — | + |
| <i>Alb. pyogenes</i> | 3 | + | + | + | + | — | — | + |
| <i>Alb. epidermidis</i> ... | 3 | + | + | + | + | — | + | + |
| <i>Aur. mollis</i> | 2 | + | + | + | — | — | + | + |

A. GROUP OF AEROBIC SPORE-FORMING BACILLI⁴.—The aerobic spore-formers have not as yet been satisfactorily differentiated into specific types. I shall therefore give only the general characters of the group and refer for details to standard books like those of Chester (6) and Migula (23), and especially Goadby (9), where full descriptions of the aerobic spore-formers that occur in the mouth will be found. The organisms of this type usually belong to the mesentericus group, though a large list of names which are undoubtedly synonyms have been used to differentiate them. Thus, there are the *B. gingivae pyogenes* and *B. pulpae pyogenes* (Miller), the *B. gangrenae pulpae* (Arkovy), the *mesentericus vulgatus*, *ruber* and *fuscus*, respectively, and so on. I have been able to identify only two groups among the isolated organisms. By far the greater number were of the mesentericus variety.

(a) *Mesentericus group*. *Morphology*.—Long, round ended rods, 0.7-1 μ . wide and 2-4 μ long; often long threads; form large oval spores. *Chromology*.—Stain well with ordinary stains and with Gram's. *Cultural characters*.—On agar a thick, dry, corrugated, greyish growth is obtained in 18-24 hours. Gelatin is rapidly liquefied. On broth a pellicle is formed.

⁴ Since this paper went to print, Maher published an article in the *Medical Record* (1915, vol. 88, p. 89), in which he attempts to show that all organisms are but modified descendants of spore-forming bacilli. In this connection he states that although he made many hundreds of cultures from human sputum, he was never able to grow spore-bearing bacilli in any kind of culture media, solid or liquid. This finding disagrees with those of all other workers in this field. While I have not been able to find spore-formers as frequently, or as abundantly, as did previous observers, I have isolated them in quite a number of cases.

Glucose, lactose and sucrose are fermented. Milk is clotted and digested. Indol and ammonia are produced in peptone-water. The organisms are aerobic but they grow (though less readily) under anerobic conditions.

(b) *Subtilis* (?) group. *Morphology*.—This type is characterized by a short, thick, square-ended rod $1 \times 2 \mu$. It is actively motile and produces large oval spores. *Chromology*.—It takes all stains readily, but reacts variably to the Gram. *Cultural characters*.—This bacillus is strictly aerobic, gives a brownish spreading growth on agar, liquefies gelatin and digests milk. Glucose is fermented but lactose and sucrose are usually not attacked. It produces ammonia but no indol. It is thus in every way sharply differentiated from the mesentericus group. It was found on normal but not on decayed teeth, while the mesentericus was found on both.

(c) *B. maximus*. This organism has been described by Miller and others, but was first grown in pure culture by Goadby. It does not grow rapidly on ordinary media when first isolated but can be readily adapted to artificial environments. I have isolated only three strains and those from "dirty" normal teeth. They agreed in all essentials with the type described by Goadby.

Morphology.—Long, thick bacillus; often chains and long, winding threads. It is non-motile and forms spores. *Chromology*.—Young cultures stain readily with the anilin dyes and by Gram. Older cultures stain irregularly and decolorize by Gram. *Cultural characters*.—On agar: small, round, raised, brownish colonies. On the streak they grow as discrete colonies that flow together somewhat, giving a granular, lustrous, brownish growth. Gelatin is liquefied slowly. In broth, growth is scant. Glucose and lactose are fermented. No indol or ammonia is produced. Growth is better at 37° C. than at 20° C.

B. ANEROBIC SPORE-FORMING BACILLI. Fifteen strains belonging to this group have been studied. Judging from their various characters, all belong to the same type—*B. putrificus* of Bienstock (4). They resemble the organism found by Rodella (28a) though their qualities do not wholly agree with the incomplete description given by him.

(a) *B. putrificus*. *Morphology*.—A long, thin rod 0.6μ . \times

4-8 μ . *Chromology*.—Stains readily with ordinary stains but is decolorized by Gram's method. In this respect it differs from the property ascribed by Rodella, whose organism was Gram-positive. All my 15 strains were Gram-negative. The rod varied in length and thickness according to the age of the culture and nature of the medium, but these variations were noted in the same strain as well as in the different strains. *Biological properties*.—The bacillus is motile, strictly anerobic, and forms oval-end spores. It closely resembles the tetanus bacillus, except for the fact that its spore is oval whereas that of the latter is round. Rodella claims to have observed a central spore, an observation also recorded by Bienstock (4). I have not seen spores anywhere else than at the end and am of the opinion that Tisier (31) was correct in his description of this organism. Spores are generally formed after 48 hours. *Cultural characters*.—In agar-stabs the growth has a fluffy appearance, which is more marked in glucose-agar. In glucose-agar, gas is usually produced. Gelatin is liquefied. The growth in the gelatin-stab is much like that in agar. In broth and sugar-broth a heavy uniform turbidity is produced. Glucose and lactose are regularly fermented, while sucrose is feebly acted on by some and not at all by others. Milk is digested with a final acid reaction. Indol and ammonia were produced by all, nitrates were reduced by only a few. The various properties are summarized in Table XIX.

TABLE XIX.—DATA PERTAINING TO THE *B. PUTRIFICUS* ISOLATED FROM DECAYED PULP.

| Type | No. of strains | Gram | Spores | Glucose | Lactose | Sucrose | Gelatin | Indol | Ammonia | Nitrates | Casein |
|------------------------------------|----------------|------|--------|---------|---------|---------|---------|-------|---------|----------|--------|
| <i>B. putrificus</i> , I. | 8 | — | + | + | + | + | + | + | + | — | + |
| <i>B. putrificus</i> , II. | 9 | — | + | + | + | — | + | + | + | — | + |

C. NON-SPORE-BEARING BACILLI. The third group of bacilli consisted almost entirely of a single type. There were two or three colon-like organisms, a few diphtheroids and two strains of the Friedlander bacillus; but the majority belonged to the group

of Gram-positive, actively acid-producing rods. In this division there were two distinct organisms: one a thin pleomorphic rod readily adapted to ordinary media; the other a thick, non-pleomorphic, beaded bacillus which could not be grown for more than two or three generations on artificial media. The former was observed most frequently in the material obtained from carious teeth, the latter in that from normal teeth. Of the former about 60 strains were studied; of the latter, only five could be kept alive sufficiently long to ascertain some of its peculiarities.

The pleomorphic bacillus undoubtedly belongs to the acidophilus or acidific group of organisms found in human and animal feces, first by Moro (25) and later by Finkelstein (8), Rodella (28), Mereschkowsky (24), Kendall (15), and others. Goadby (9) describes an organism isolated by him from the deep layers of decayed dentin which agrees in most particulars with this type.

In this investigation 58 strains, isolated from material at the different stages of decay, were reserved for detailed study. The organisms were highly pleomorphic but constituted, on the whole, a single homogeneous group, which could be separated into two varieties by differences in their fermentive actions on sucrose.

(a) *B. acidophilus* (Moro). *Morphology*.—The bacillus is highly pleomorphic, varying from a uniform, small, colon-like rod to long winding threads. On agar streaks it is usually $0.6 \times 1.5\text{--}2.0 \mu$ and occurs in twos, often in long chains. Under anerobic conditions the rods are longer and frequently filamentous. *Chromology*.—Young cultures stain readily though faintly with the ordinary dyes and retain the stain when treated by Gram's method. *Biological properties*.—It is a facultative anerobe, grows better under anerobic conditions when first isolated, is not motile, does not form spores, and grows better at 37°C . than at 20°C . Cultures recently isolated should be transferred every 10 days or so. Cultures that have been adapted to artificial media live much longer. *Cultural characters*.—It can be best isolated on media containing glucose and made sufficiently acid preferably with acetic acid to inhibit the growth of other organisms (an acidity of 3-4 per cent. *N* acid is most satisfactory). It may also be readily obtained from glucose-agar or glucose-broth which has

been incubated for about 5 days to a week, the marked resultant acidity generally killing off the other organisms and the *acidophilus* being obtained in pure culture in the second or third subculture in glucose media.

On agar and glucose-agar the colonies are very small, usually not more than 0.5-1 mm. in diameter. Microscopically they show a dark center with radiating strands. Glucose-agar is always rendered distinctly turbid. Gelatin is not liquefied. In broth there is a heavy sediment with little turbidity. Milk is usually, though not always, clotted, the lower portion being coagulated first. Litmus-milk is decolorized. Glucose is readily fermented with the production of a large amount of acid, often equivalent to about 7-8 c.c. of *N* sodium hydroxid per 100 c.c. of medium. Lactose is fermented but not attacked with the same avidity. Sucrose is readily fermented by some but not by others; maltose is broken down by all. Neither ammonia nor indol is produced in a peptone solution. The salient characters are summarized in the accompanying Table.

TABLE XX.—DATA PERTAINING TO *B. ACIDOPHILUS* ISOLATED FROM DEPOSITS ON NORMAL AND DECAYED TEETH.

| No. of strains | Gram | Glucose | Lactose | Sucrose | Milk: Clot | Litmus milk: Reduction | Gelatin | Indol | Ammonia |
|----------------|------|---------|---------|---------|------------|------------------------|---------|-------|---------|
| 3 | + | + | — | — | — | — | — | — | — |
| 35 | + | + | + | — | + | + | — | — | — |
| 20 | + | + | + | + | + | + | — | — | — |

(b) The *non-pleomorphic beaded bacillus* has not been described before as far as I was able to ascertain. In a recent paper Serkowski (29) describes as a new species an organism resembling this bacillus, which he isolated from nasal secretion, and from the bladder in rhinitis and cystitis, respectively, and from the normal mucus of the conjunctiva, nose and mouth. I am not sure, however, whether the two organisms are identical.

Morphology.—A medium thick rod $1 \times 3 \mu$. *Chromology*.—Stains readily with ordinary dyes, giving a beaded appearance

(usually two or three beads) with gentian violet and a granular, structure like that of the diphtheria bacillus when stained with methylene blue. The number of granules correspond with the number of beads. It is Gram-positive. *Biological properties*.—The bacillus is a facultative anerobe; non-spore-forming, non-motile; grows better at 37° C. than at 20° C. and is not readily adapted to artificial cultivation. This last property distinguishes it from the *B. granulobacillus* of Serkowski. *Cultural characters*.—On agar plates the colonies are very small, 0.5 to 1 m.m. in diameter, white, round and slightly raised. Anerobically, the growth is in the form of small spherical discrete colonies. Gelatin is not liquefied. Glucose and lactose are fermented and milk clotted. Sucrose is usually not fermented.

For the present, until a further study of this form may definitely establish its relationship to the *granulobacillus* of Serkowski, that name may be applied to this type. I suggest, however, that the crude, unwieldy name *B. granulobacillus putrificus* be modified to *B. granulatus*.

TRICHOMYCETES. The family of filamentous bacteria is indeed puzzling. It is not even clear whether the different members belong to the same phyla. Petruschky (26), in the latest edition of Kolle and Wassermann's work, divides these organisms into two families, the *Trichomycetes* and *Trichobacteria*. The former, including the branched forms, *Actinomyces* and *Streptothrix*, he classes with the *Hyphomycetes*; the latter, consisting of the *Cladothrix* and *Leptothrix*, he groups with the *Schizomycetes*. This division seems to distinguish the natural relationships of these forms but cannot as yet be considered final.

So far the typical mouth representatives of this family have not been successfully grown on artificial culture media. Goadby has isolated and described a species belonging to the genus *Actinomyces*. I have also isolated this type from a number of cases, but it occurs only irregularly and not in sufficient numbers to be found frequently in dilutions above 1:1000. The true, mouth, thread-forms, however, have not hitherto been isolated except perhaps in the single instance reported by Dobrzyński.

I have succeeded in cultivating two distinct species, one of which consists of at least two varieties. One type is present

on all kinds of human teeth but is especially abundant in caries of the first and second stages. The other has been found on normal teeth only twice in the higher dilutions, but was very abundant and was isolated regularly from all cases of caries of enamel and dentin. Both species are practically absent in the advanced stages of pulp-decay, and are present in only moderate numbers in its early stages.

The forms most abundantly present in the mouth belong to the non-branching *Trichobacteria*. Whether they are both true *Leptothricea* is doubtful. Since Miller's day, when differentiation of types was more difficult, there has been a tendency to call everything that looked like a thread, *Leptothrix*. What has been said above, of the pleomorphic thread-forming rods, shows the fallacy of this assumption.

Leptothrix-forms were first detected, under pathological conditions, by Frankel (26), in the follicles of the tonsils and at the base of the tongue. Chiari (26) reported a case of pharyngomycosis which he attributed to *L. buccalis*. Arustamoff (2) is the only one who has apparently succeeded in cultivating a non-branching leptothrix from tonsillar-deposit in two cases of pharyngomycosis, and one from the urine of a patient with tabes. The organism he describes is 0.5-0.6 μ thick and from 8-50 μ long. The one obtained from the urine grew best at 37° C., poorly at 20° C., and grew only in the stab. There was no growth on gelatin and hardly any in broth. The one from the pharynx grew best at 37° C.; grew on the surface, and liquefied gelatin. This is the only authentic though meagre description of the cultural characters of a true *Leptothrix*.

One of the types I have isolated resembles this closely, the other corresponds in a general way with the *L. placoides albus* of Dobrzyniecki and is more probably a *Cladothrix*. This latter organism will be described first and, since it has some of the general features of the form described by Dobrzyniecki, the name *placoides* is retained, the generic name *Cladothrix* used, and the last part dropped to avoid a trinomial. The name *placoides* is specially appropriate for this organism, because of its property to form plaque-like colonies that cling to surfaces.

(a) *Cladothrix placoides*.—Fifty-eight strains of this or-

ganism were studied. Judged from the growth on agar there were two distinct varieties, one giving a dry, granular, non-lustrous growth on the streak with a raised, non-lustrous, convoluted colony; the other giving a moist, lustrous, grayish-white to white growth, and a round, raised, discrete glistening colony, which sometimes became wrinkled in old cultures. These differences could not, however, be correlated with other morphological and physiological properties. All the strains are, therefore, for the present included in the same group, leaving further differentiation to future study. Of the 58, 42 were Gram-positive, 17 liquefied gelatin, 30 fermented glucose and sucrose, and 17 also fermented lactose. Most of them reduced nitrates, while all failed to produce ammonia or indol.

Morphology.—The morphology of this organism is very variable. It often appears like a coccus, sometimes like a diphtheroid rod, or short club-end thread. Usually one finds all three in the same preparation. The coccus-like forms are probably spores, and the others are pleomorphisms of the thread. Microscopic pictures are often obtained which look identical with *L. innominata* of Miller. *Chromology.*—It stains readily with ordinary anilin dyes and is usually Gram-positive. Often the spores retain the stain while the threads are decolorized when treated by Gram's method. *Biological properties.*—They are aerobic, non-motile, non branching threads. They grow best at 37° C., only very slowly at 20° C. *Cultural characters.*—On agar they form round, raised, lustrous, white colonies which can be picked up entire from the medium. On glucose-agar the colonies are usually larger and more grayish. Microscopically the surface colonies are convoluted and are often seen on the plates enclosing underneath them small colonies of other bacteria. In broth the growth is very sparse, and the wall of the tube is usually covered with a granular layer of discrete colonies 0.5 mm. or less in diameter which are not readily removed by shaking the tube. In glucose-broth the growth is very abundant, giving both a heavy turbidity and a granular deposit on the wall. Gelatin was liquefied by some strains but not by others. They all fermented glucose, most of them fermented sucrose, while some also fermented lactose. Gas is not produced. They generally

reduce nitrates and fail to produce indol or ammonia. When first isolated they should be kept on glucose-agar and transferred every two weeks.

(b) *L. buccalis*. (Miller, Kligler). Fifteen strains of the true *Leptothrix* were studied in detail. They correspond with the description usually given for the typical organism. They all showed the same morphology and resembled microscopically both the *L. buccalis* of Miller and the *L. racemosa* of Vincentini and Williams. Since this organism appears to be the true mouth *Leptothrix*, I shall adopt for it the name *L. buccalis* with the following characterization.

Morphology.—A thick, long, straight, or curved thread with a club-head at one extremity and a tapering end at the other. It is generally 0.8-1 μ thick and upwards of 10 μ in length. *Chromology*.—It stains readily with anilin dyes in young cultures. In older cultures it has the appearance of a faintly stained sheath enclosing a number of heavily stained granules. Young cultures are Gram-positive. In older cultures the sheath is decolorized while the granules retain the stain. It is not pleomorphic but the threads fragment very early into short, thick rods. Coccoidal forms are not seen. *Biological properties*.—They are anerobic, facultative-aerobic, non-motile, non-branching threads. They grow at 37° C. and practically not at all at 20° C. *Cultural characters*.—No growth is obtained on agar. On glucose-agar-plates they give minute pin-point colonies after 3-4 days' incubation. Examined microscopically with a low power, they have a dark center with hairy outgrowth. They grow fairly well in serum-glucose-agar, best in the stab and only sparsely on the surface. The surface colony is raised, round, whitish, lustrous, rarely more than 0.5 mm. in diameter. The addition of salivary mucinate to ordinary agar renders the latter a very favorable medium, a thin, grayish white, spreading growth being obtained in 24 hours. Glucose, sucrose and maltose are fermented, but lactose is not attacked. Gelatin is not liquefied and neither indol nor ammonia is produced.

The branching forms correspond with the *Streptothrix buccalis* described by Goadby. Eight strains were studied. All gave a hard, brown leathery growth which stuck fast to the

medium. Microscopically they are long, irregular, branching threads, the branches usually being almost at right angles to the main thread. They reacted variably to the Gram-stain, fermented glucose slowly, but failed to attack lactose or sucrose. Gelatin was usually liquefied. Indol was not produced.

In one instance a yeast and in another an oidium-like organism was isolated, but these forms are not significant and need not be described here.

Bibliography.

1. Andrewes and Horder: *Lancet*, 1906 (2), p. 708.
2. Arustamoff: *Cent. f. Bakt. (Ref)*, 1889, vii, p. 349.
3. Baumgartner: *Wiener klin. Woch.*, 1913, xxvi, p. 178.
4. Bienstock: *Ann. de l'Inst. Pasteur*, 1899, xiii, p. 854; 1900, xiv, p. 750; 1906, xx, p. 407.
5. Broadhurst: *J. Inf. Dis.*, 1912, x, p. 272.
6. Chester: *Manual of Determinative Bacteriology*, 1909.
7. Elser and Huntoon: *Jour. Med. Res.*, 1909, xx, p. 369.
8. Finkelstein: *Deut. med. Woch.*, 1900, xxii, p. 263.
9. Goadby: *The Mycology of the Mouth*, 1903.
10. Gordon: *Rep. of Med. Off., etc.*, 1902-3, xxxii, p. 421.
11. ———: *Ibid.*, 1903-4, xxxiii, p. 388.
12. Hartzel and Henrici: *J. Am. Med. Ass'n.*, 1915, lxiv, p. 1055.
13. Hopkins and Lang: *J. Inf. Dis.*, 1914, xv, p. 63.
14. Kantorowicz: *D. Monat. f. Zahnheilk.*, 1908, xxvii, p. 553.
- 14a. ———: *Erg. d. ges. Zahnheilk.*, 1912, iii, p. 49.
15. Kendall: *J. Med. Res.*, 1910, xvii (n.s.), p. 153.
16. Klein: *Arch. f. Hyg.*, 1902, xlv, p. 117.
17. Kligler: *J. Inf. Dis.*, 1915, xvi, p. 327.
18. ———: *Ibid.*, 1913, xii, p. 432.
19. Krumwiede and Pratt: *Ibid.*, 1913, xii, p. 199.
20. Lingelsheim: *Klin. Jahrb.*, 1906, xv, p. 373.
21. MacNeal, Latzer and Kerr: *J. Inf. Dis.*, 1909, vi, p. 571.
22. Lyall: *J. Med. Res.*, 1914, xxv (n.s.), p. 487.
23. Migula: *System der Bakterien*, 1897.
24. Mereschkowsky: *Cent. f. Bakt.*, 1905, xxxix, p. 380; 1906, xl, p. 118.

25. Moro: *Jahr. f. Kinderheilk.*, 1900, li, p. 47.
26. Petruschky: Die pathogenen Trichomyceten, Kolle and Wassermann, 1913, v. p. 267.
27. Rettger: *Jour. Biol. Chem.*, 1906, ii, p. 71.
28. Rodella: *Cent. f. Bakt.*, 1901, xxix, p. 717.
- 28a. ———: *Archiv f. Hyg.*, 1905, liii, p. 329.
29. Serkowski: *Cent. f. Bakt.*, 1914, lxxv, p. 1.
30. Stowell, Hillard and Schlesinger: *J. Inf. Dis.*, 1913, xii, p. 144.
31. Tisier: La flore intestinale des nourissons, Paris, 1900.
32. Winslow: *J. Inf. Dis.*, 1906, iii, p. 209.
33. ———: *Ibid.*, 1912, x, p. 285.
34. ——— and Winslow: Systematic Relationship of the Coccaceæ, 1908.

EXPLANATION OF PLATES

PLATE 1

Fig. 1. *Cladothrix placoides*. A 48-hour culture on glucose-agar, showing abundant growth and discrete white colonies.

Fig. 2. *Leptothrix buccalis*. A.—A 72-hour culture, kept about 9 months on artificial media, showing abundant growth on ascitic-fluid-agar. B.—A recently isolated culture showing only deep colonies in ascitic-fluid-agar. C.—A recent culture on ascitic-fluid-agar, showing better growth in stab than on surface.

Fig. 3. *B. acidophilus*. A 24-hour slant-culture on glucose-agar, showing colon-like rods. Stained with gentian violet.

Fig. 4. *B. acidophilus*. A 72-hour stab-culture in glucose-agar, showing pleomorphic rods. Stained with gentian violet.

Fig. 5. *B. putrificus*. A 48-hour culture, showing different stages of spore-formation and club-end spore. Stained with carbol-fuchsin.

PLATE 2

Fig. 6. *Cladothrix placoides*. A 72-hour culture, showing club-end threads, rods and coccoidal spores. Stained with methylene blue.

Fig. 7. *Cladothrix placoides*. A 48-hour culture stained with gentian violet.

Fig. 8. *Leptothrix buccalis*. A 48-hour culture, showing long, thick, club-end, tapering threads; some fragmented. Stained with gentian violet.

Fig. 9. *Leptothrix buccalis*. An older culture stained with carbol-fuchsin, showing faintly stained threads with heavily stained granules.

THE VALUE OF A TOOTH¹

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The expression "carrying coals to Newcastle" must apply, I think, with great force to any speaker who ventures to address the First District Dental Society of New York, for we all know that its members are noted for keeping fully abreast of the times; and in this keeping fully abreast of the times there lurks a danger. The danger is, I might say, a condition of mind that befogs one somewhat in the true adjustment of values. We all know how difficult it is to adjust material values. And how much more difficult it is to adjust physiological values!

In the misjudging of material values our pocketbook alone is affected. In misjudging physiological values the happiness, health, and frequently the life of the people is jeopardized.

I formed for myself years ago, without any really scientific foundation for such formation, the principle that a tooth that could not be made absolutely healthy was a menace to the welfare of the person harboring such a tooth. For instance, I never was one who believed in ligating loose and diseased lower incisors for the sake of keeping them in position for looks. I always felt that teeth, when they had reached that condition of pathological change, were far better out of the mouth than in the mouth, and that principle, founded then, as I say, without scientific reasons, has to-day its scientific reason, which is that oral sepsis is a factor in systemic conditions and must be scientifically dealt with.

Therefore I am here to-night through the courteous invitation of your President, to present to you some of my ideas in regard to the adjusting of values as that adjustment applies to teeth, and I present this proposition for your consideration to keep in mind while this topic is being presented and afterwards discussed: namely, a tooth is valuable in proportion as it is

¹ Read before the First District Dental Society, S. N. Y., Feb. 1, 1915. See disc., p. 361.

healthy and approaches or departs from normal environment. I do not say normal occlusion—I say normal environment.

I should preface my subject by saying that Dr. Brackett, who was to be here to-night to discuss my paper but on account of illness will not be able to be present, caused to be sent to me through his wife a letter saying he very much regretted that he would not be able to be here and support my paper. "And be good enough, Dr. Smith, so to qualify your remarks that you will not be misunderstood and have people believe that you believe in the wholesale extraction of children's teeth."

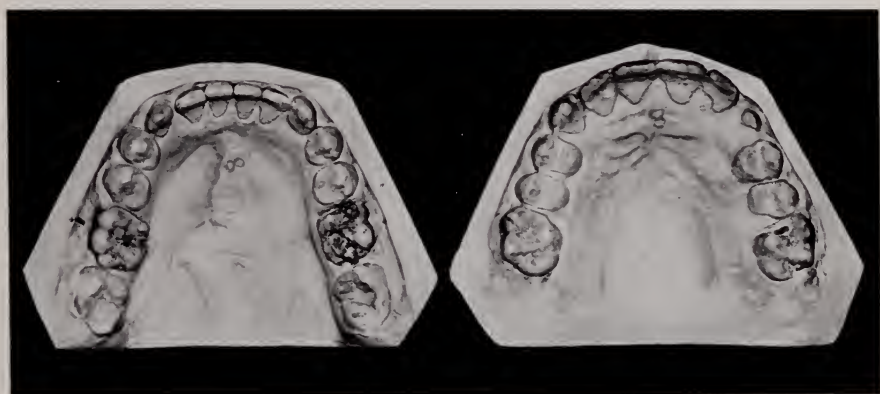
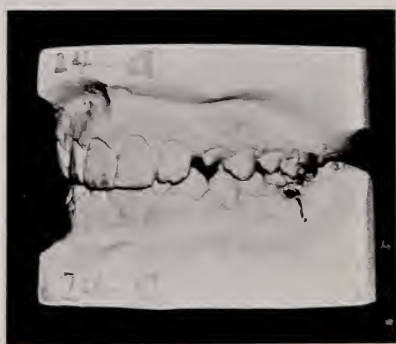
So I will try to qualify my remarks by stating in the beginning that in cases of malocclusion within the orthodontic period—and the orthodontist himself, I believe, has not yet decided just what that period is—but within that orthodontic period there are few if any cases where extraction should be resorted to; but beyond that period—in more advanced life, at the ages of eighteen or twenty, good results can only be obtained by extracting, and it is only by the judicious study of each case that one is able to determine the tooth or teeth to be extracted.

Now we have two extremes in the interpretation of the value of a tooth. One we may say is the wholesale extractor, and the other the wholesale conservator. Between these two it seems to me is to be found the true value.

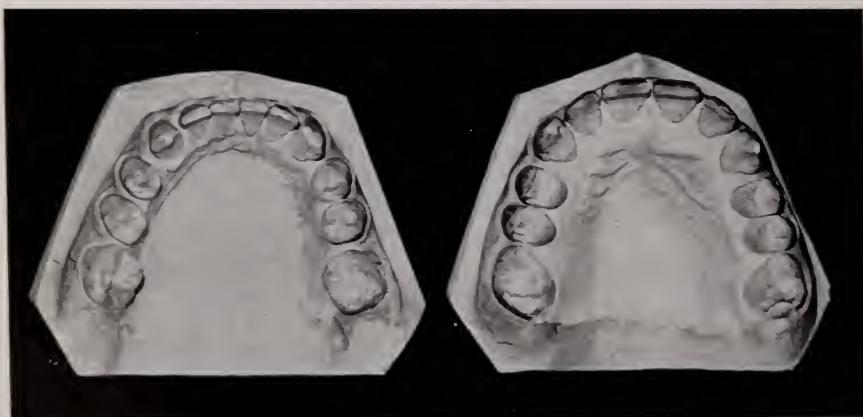
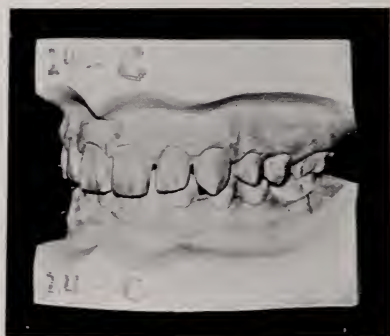
Let us first consider the wholesale extractor, who would extract all teeth in malocclusion and most teeth that are badly decayed. Do not think for a moment that I agree with that wholesale extractor.

Now let us consider the wholesale conservator of teeth, who will go to no end of trouble to save teeth that can only be made to last a few years at best, and during those few years produce more or less discomfort to the patient, to be followed by a train of evils—who in treating a case of malocclusion, no matter what the age, will under no circumstances extract, and if perchance a first permanent molar has been lost earlier in life, will take steps to put in an artificial substitute, either by plate or bridge, in order to procure normal occlusion.

Now to ride safely between those two extremes requires judgment founded on the careful study of each case.



Case 1—Models A



Case 1—Models C

With your permission, and with the aid of my slides,² I will let you determine by these few cases which represent a larger number of cases, these being typical ones, whether between these two extremes I have ridden safely and wisely.

These models are of mouths taken twenty or thirty years ago, when the art of model-making was no art at all; and, furthermore, they were varnished and made pretty at the time, and the result is it is impossible for the best artist to make of them the slides that can now be made from beautiful impressions and artistic models. The value of these models is in their antiquity, because the only way we can judge of results is through a term of years.

I will give you a brief history of these various cases.

Case 1. (No. 24). —Extraction on account of diseased teeth.

History—Male, age 13.

Models A—Four pictures, showing conditions as follows:

Lower right molar pulpless. Apical foramen not closed.

Lower left molar pulp exposed.

The upper molars decayed.

Extracted the four first molars.

Models C—Three years later, showing condition.

The patient came into my hands in 1886. You will note that the lower left molar had been extracted before the patient reached me, and I extracted the remaining first molars.

No appliances were used. The case was simply looked after so that if anything went wrong it could be corrected. You see here the large gap from the loss of the first permanent molar. Here is where the molar was—here is the exposed pulp, and here was a fairly good first molar. In five years' time the twelfth-year molars had moved up to place. Later there came the two wisdom teeth, which I have not the slides to show.

This is a case where we had, even at thirteen years, a considerable amount of proximal decay. The letting-up, so to speak, upon this proximal pressure has given this condition.

Case 2.—The next history is that of a boy of thirteen years of age. The lower right molar pulpless, apical foramen not closed,

² It seems unnecessary fully to illustrate this paper, and the following photographs will, I think, illustrate the main points that I have endeavored to make

the lower left molar pulp exposed, the upper molars in fair condition. I extracted the four first permanent molars. That was in October, 1889. In March, 1890, the bicuspid were moving back more than I wished, and I inserted a simple stay plate to have them remain where I wished them to.

Case 3.—The next is that of the mouth of a girl fourteen years old,—the sixth-year molars much diseased—the pulps exposed in the upper molars. I extracted these molars.

Four years later, the four slides will show the condition.

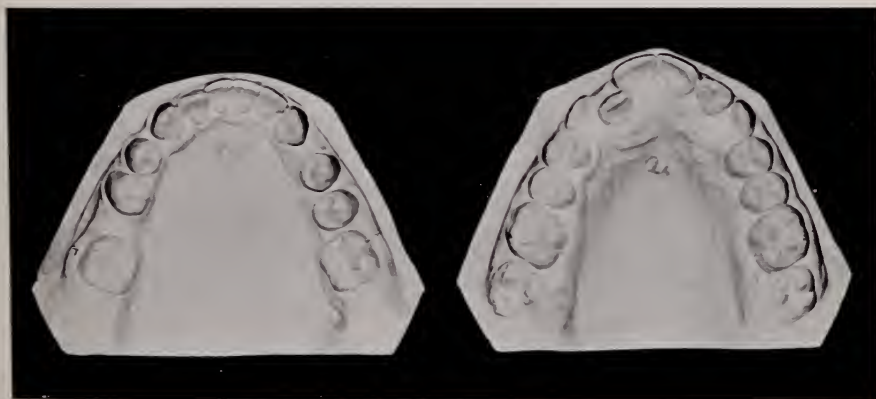
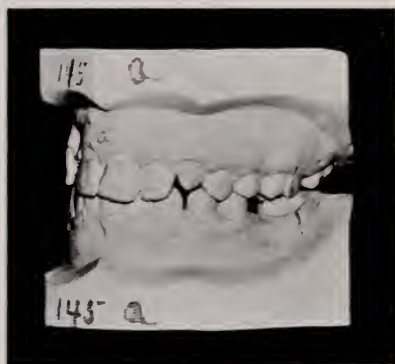
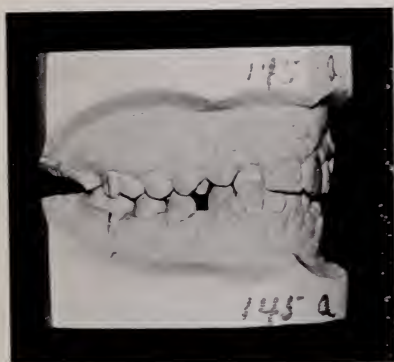
Case 4.—These models were taken in 1881, and the interest in this case to me is this: it is that of a man twenty-five years of age. The first four slides show conditions previous to the patient coming into my hands. He had lost the first permanent right molar. He had this prominence of the cuspid teeth, which seemed more noticeable in the mouth than in the model. He had unusually long central incisors, and in college he was commonly called "Long Tooth Jones"—although Jones was not his name.

He asked me if something could not be done, even at his age, to improve the appearance of his mouth, and I told him I felt he was rather old to have his teeth regulated; but possibly by some extracting we might get some good results. I resorted to extraction, as evidenced here.

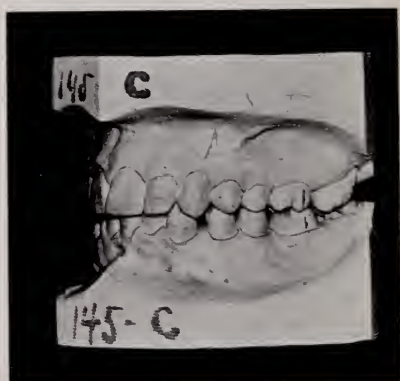
It was my habit when taking an impression and extracting the teeth to put the teeth into the impression so that they would appear in the model; but this was cast and the model poured without putting the teeth into the model.

At that time, in 1881, I extracted the upper left first permanent molar. Simply to produce an occlusal balance, I extracted the one on the other side—he having lost the right first permanent molar. Two years later I extracted the right upper molar. The teeth dropped back, closing up the spaces, the cuspids gradually dropping to place. Remember, he was "going on" twenty-six years of age.

You see here, later, how well these teeth were dropping into position. This cuspid dropped lower back. Here is the palatal aspect. About that time I shortened the central incisors, so from the front view it gave his mouth an entirely different look.



Case 5—Models A



Case 5—Models C

The frontal view of the case shows the improvement after that extraction. He is now a man fifty years of age, and he still comes to me twice a year to have his teeth looked after.

Case 5. (No. 145).—Extraction for occlusal balance.

History—Female, age 15.

Models A—Showing condition as follows:

The lower first permanent molar had been extracted previous to the patient coming into my hands.

I extracted the upper right, first, bicuspid.

Models C—Showing condition after six months. Regulating appliance was used.

In this case, after studying the models, I extracted the upper right first bicuspid. Appliances were used in this case.

The first four slides will show the condition before anything was done. After I extracted the bicuspid and relieved the occlusal plane relation there, these teeth closed up.

The only other way to treat that case would have been to make room and supply the permanent molars which had been lost years before—which would have subjected this child to the wearing of bridgework and plates all the rest of her life.

Case 6. (No. 105).—Extracted on account of malocclusion.

History—Female, age 14.

Patient on the verge of nervous breakdown.

Physician thought it very unwise to subject her to any nervous strain.

I extracted the superior second bicuspid and the lower, right, second bicuspid.

Models A—Showing condition at that time.

Models B—One year later, showing change that had taken place.

Models C—Thirteen years later, showing condition.

This case is interesting on account of its history. There was no earthly reason from an orthodontic standpoint for extracting, and there was every reason from an orthodontic standpoint for not extracting.

The patient was an extremely nervous girl fourteen years of age, and her physicians were of the opinion that if she were subjected to any kind of disturbance incident to the regulating of the teeth it might mean a permanent condition of ill-health. This condition was explained to three different dentists. and

each one replied that the arches should be widened and the teeth brought to normal occlusion—that to do any extracting in this case would mean ruination of the mouth.

I agreed with those dentists that the arches should be widened, but I could not agree that under the circumstances judicious extraction would ruin the mouth, and I want to leave it to you whether you think the mouth was ruined by extraction.

I took models of this mouth, studied it carefully, and decided to extract the superior second bicuspid and the lower right bicuspid.

Some of you remember that it was the rule that if you extracted a permanent molar you must extract the other three. If you extracted a bicuspid you must extract the other three. That was the law. Now there is no law, except that you should not extract them.

It was in a sense a simple case of regulating, as we understand orthodontic procedure to-day, but the conditions that led me to extract I have outlined to you.

In models C, thirteen years after, you see how nicely these teeth have dropped into place, and how nicely they come together. The only excuse I made for this extraction was the condition of this girl; and yet I cannot believe that thirteen years after the condition indicates that this mouth was ruined. There is certainly an efficient occlusion. During that terribly nervous condition there were five to eight years when her health hung in the balance. To-day she is a healthy and strong woman.

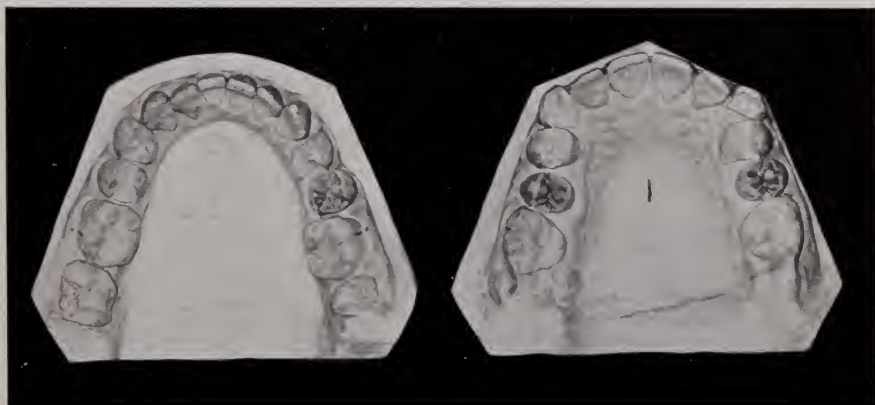
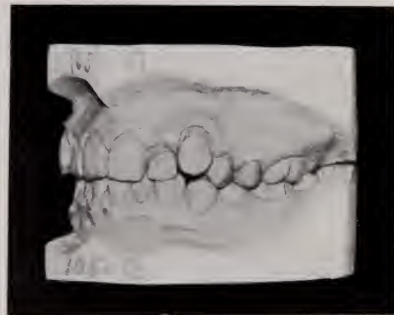
Case 7. (No. 186).—

History—Male, age 35.

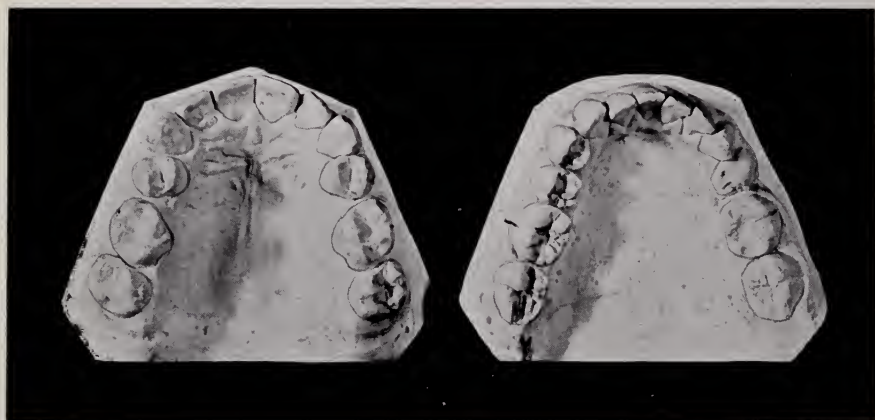
The four first permanent molars were extracted by a former dentist when patient was about 16 years of age.

Model A—Showing condition when he was 35 years of age.

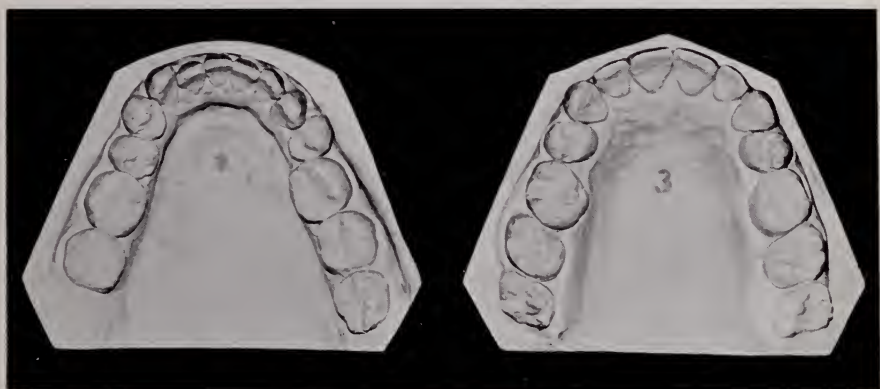
Case 8.—This is another case where, so far as orthodontic procedure was concerned, there was no special excuse for extracting. This was done in 1885, when I knew less about orthodontia than I do to-day. It was the case of a boy fifteen years of age, also of a nervous temperament. That would not be sufficient, like the other case, for warranting the extraction; but here is the result of extraction and without appliances.



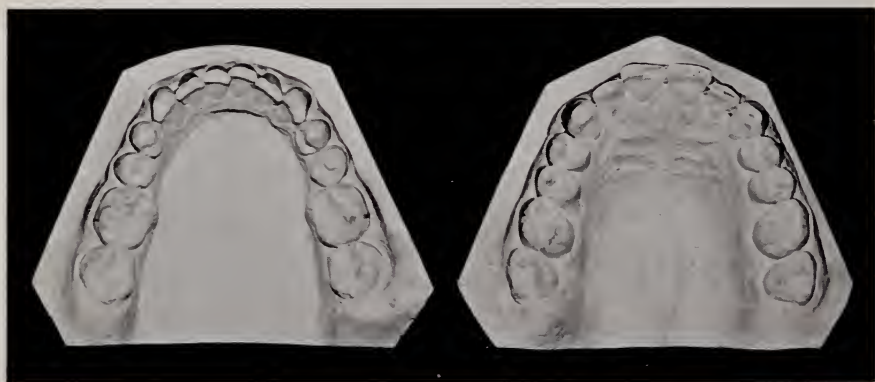
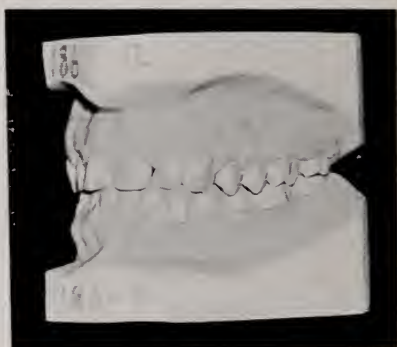
Case 6—Models A



Case 6—Models B



Case 6—Models C



Case 7

The remaining slides have nothing to do with extracting diseased teeth or extracting for balance in malocclusion. It is simply an interesting case. It came to me through one of my patients who is interested in prehistoric people and is the owner of several mounds in Florida, and from one of those mounds was unearthed this skull. It is supposed to be the skull of a Seminole Indian. It will be remembered that Florida was discovered about 1500, and just how old this skull is we cannot say; but we know the Huguenots found the Seminole Indians in possession of Florida when they went there.

It is interesting to me as showing a typical race, and also showing that teeth in a complete denture and supposedly in normal occlusion, will wear down to an absolutely smooth surface. You have probably heard it stated that in case teeth are extracted it tends so to change the relation of the occlusal planes that in after life the occlusal planes disappear—prognathic conditions result, and the teeth become smooth.

This case shows teeth absolutely worn to a smooth surface and with an end to end bite. I cannot help but feel that in his youth he had normal occlusion, and in spite of that his occlusal planes were worn down, which resulted in the end to end bite.

PRESIDENT'S ADDRESS¹
MAINE DENTAL SOCIETY.

BY HARRY P. JONES, DD.S., NORWAY, MAINE.

Members of The Maine Dental Society, Ladies and Gentlemen:

It is with pleasure that I extend a cordial welcome on this the fiftieth meeting of The Maine Dental Society.

It is not my intention to give a history of the society, for that work has been assigned to Dr. D. W. Fellows; but it may be interesting to speak, at this time, of its organization and a few of the men who were influential in that work.

This society was formed by a call issued early in September, 1866, to assemble at the new Medical College Building, Brunswick, Maine, on the twenty-fifth day of the same month. This call was signed by Drs. A. K. Gilmore, of Bath; William Randall, Farmington; Strout and Fillebrown, Lewiston; Thomas Haley, Biddeford; L. Gilman Gardner, of Portland; J. W. Russell, Oakland, and J. Mason, Saco.

Dr. Albion K. Gilmore, of Bath, who has been called "The Father of The Maine Dental Society," as he was active in getting signers to the Call, was born in Turner, Maine, in 1832. He studied dentistry with his elder brother, Langdon Gilmore, of Gardiner. He was a very intelligent man, and had many pupils; an active member of this society; served on the executive committee; was elected President in 1868, and was sent as a delegate to The American Dental Society.

The first President was Elbridge Bacon, M.D., D.D.S., of Portland.

He was a charter member of The Maine Dental Society, and had the honor to be again elected President at the twenty-fifth anniversary, the only time when the same man has served twice.

Dr. Bacon, born in 1811, was a native of Barre, Mass. In 1836 he entered the dental office of his uncle, Dr. Daniel Har-

¹ Read before the Maine Dental Society, Portland, 50th anniversary meeting, June 28-30, 1915.

wood, of Boston, where he remained two years, coming to Portland in 1838. While there he attended lectures at the Medical School of Maine, and graduated in 1839.

A full review of the life and work of Dr. Bacon, and the changes that took place during his practice, would be almost a history of dentistry in America. He continued to practice until well past eighty, when an accident compelled his retirement.

In his profession Dr. Bacon was skillful, enthusiastic and conscientious; as a man he was courteous, kind and generous, modest and unassuming; honored, respected and loved by all.

The following is taken from *The Dental Cosmos*, 1867:

"The dentists of Maine are well aware of their backwardness in the formation of a society, and now that they are on the right track, they feel they would like the profession in the other states to be aware of it."

It seems to-day that we made an early start, for in and about the year 1820 there were not more than thirty dentists in the United States; but the improvements in mechanical dentistry were so rapid in those years that in 1830 there were more than two hundred, and by 1860 there were more than five thousand persons engaged in this profession in this country.

The first program did not have the long list of interesting clinics and papers which we demand to-day, but consisted of a discussion of the question: "The Responsibility of the Profession in Regard to Dental Students, and the Proper Means to Elevate the Standard of the Profession."

There was one clinician, Dr. I. A. Salmon, of Boston, who, in the office of Dr. Lombard, of Brunswick, gave a clinic demonstrating the use of the new dental dam in inserting a gold filling in a bicuspid. Dr. Lombard is the only living charter member of The Maine Dental Society who was present at the first meeting—for Dr. E. J. Roberts, although a charter member, was unable to attend at that time.

Dr. Roberts, elected secretary in 1868, served until chosen vice-president in 1872 and was made president in 1873. He served on the executive committee a few years, was elected treasurer in 1881, and has continued in that position, thus holding the record for continuous service. He is our oldest ex-president.

Probably no one has ever done more for the profession in Maine than the late Dr. Thomas Fillebrown.

His native place was Winthrop, Maine, where his father, Dr. James Bowdoin Fillebrown, practised dentistry.

In 1860 he entered his father's office, and in 1861 opened an office in Auburn, Maine. In 1868 he became associated with Dr. D. B. Strout, of Lewiston, where he remained until his removal to Portland in 1875, where he succeeded to the practice of Dr. Josiah Heald. Here he remained until 1891, when he removed to Boston.

He was one of the first, if not the first, to introduce bridge work in this state. His record is enough to impress one as a man who *did* things. He seemed to have an inexhaustible vitality that enabled him to work day and night.

The records show that he was elected the first secretary in 1866. In 1868 he was chairman of the committee appointed to draft a state law for the registration of dentists.

The next year he was chosen vice-president, and the following year, president. In 1872 he was made treasurer, and two years later, librarian, which position he held until 1882. He was twice sent as a delegate from Maine to The American Dental Association.

This is his record for our own state. How often his name appeared in dental journals is well known.

His chair at Harvard gave him opportunity to put his stamp on the career of many a young undergraduate, by whom he was held in the greatest esteem. As a mechanic, a student, a surgeon, an inventor, a teacher, an author, a correspondent of many men of scientific reputation, Dr. Fillebrown assuredly may be classed among the first American dentists, who are universally recognized as the best in the world.

The second annual meeting was held in Portland, with Dr. William Randall president. At this meeting Dr. I. J. Witherbee occupied the attention of the society during the evening with a lecture on: "Filling Approximal Cavities in Teeth" and "The Treatment of Alveolar Inflammation."

Aseptic dentistry, as it is practised to-day, was unknown at that time.

Dr. Albert Thompson, who formerly practised in Norway, and from whom my father purchased his practice fifty years ago, told me only last summer that he never expected to see the time when a tooth could be devitalized and the root filled without having an abscess form. In many cases the pulp or lining-membrane, as it was then called, was devitalized with arsenic, the pulp removed, and sometimes the canal enlarged, and filled with gold, tin, or medicated cotton and a vent left for the escape of gases. This opening was made just under the free margin of the gum.

Harris' Principles and Practice (edition 1859) says: "The proper remedial agent, after the death of the lining membrane, is *extraction*." Until comparatively recently, the results of most of the efforts made for the preservation and retention of teeth fully justified the correctness of this statement; for in nine cases out of ten the operation of filling was followed sooner or later by an abscess.

The following is the treatment given by a prominent writer in 1859:

"We seldom plug a tooth unless it will bear wedging tightly with cotton without exciting *pain* or *looseness*. If wedging produces looseness, it may, if persisted in, rouse up inflammation, and when it is only filled with cotton it is easily remedied. If, after the tooth is plugged, the patient returns with elongation of tooth, with purple appearance and sponginess of the gum, and upon removing the plug considerable bleeding ensues, it shows there is engorgement of blood-vessels of the surrounding parts."

The treatment for this was to ask the patient to suck the air from the tooth, to induce bleeding, and after that had stopped, to treat the tooth high up under the gum with tannic acid.

A few medicines in use at this time were: Nitrate of potash, for threatened alveolar abscess; for odontalgia, camphorated oil or oil of turpentine; wine of opium was used to inject into an abscess cavity. For alveolar inflammation, iodine, one part, and creosote, two parts,—to paint the gum. Arsenic was used in devitalizing and for desensitizing dentin.

Root-canal filling was of gold, tin, floss silk saturated with oxychloride of zinc, wood points saturated with creosote, cotton,

or gutta-percha cones. In many cases, rather than destroy the pulp, the operators capped or bridged the filling over the exposure.

Modern dental materia medica and therapeutics and the increased knowledge of bacteriology has been of great assistance in solving many problems, particularly in the treatment of inflammation and supuration.

While the results are too recent to draw any definite conclusions, we are all greatly interested in what the scientists, by the aid of the X-ray, are finding out regarding the results following the removal, treatment, and filling of root-canals.

That the tips of all devitalized roots may become the foci of infection, causing chronic rheumatic conditions and other constitutional diseases, is beginning to receive the consideration that its importance demands. This infection may occur in two ways; first, by faulty technique in not removing all the pulp tissue, and secondly, it may be of blood-borne origin. This latter may be due to lowered resistance, and not introduced at the time of devitalization.

Probably no operation we perform is attended with more difficulty than the devitalizing, treatment and filling of root-canals.

We should consider it a miniature surgical operation, and it should be attended with as much care as if it were a major operation. What we need to do is to revise our methods and make sure we are doing this work under aseptic conditions.

The Maine Dental Society has always stood for advancement in the profession. Through its efforts we now have a dental law and a Board of Examiners. The future of the society looks bright; but there is one recommendation to make: namely, the formation of local or district societies, making them components of the state society.

We now have three local clubs. The York, which takes in any dentist in York County. The Fillebrown, of Portland, limited in membership, and The Androscoggin Valley, which, like the York, is not limited.

The next few years is going to see the greatest advancement in dentistry that the world has ever known, and the circulation of this knowledge will necessarily be made through the

dental journals and dental societies. We should be so well organized in district societies that we can, within a few months, have a knowledge of these new methods after they are brought before the profession. When a man stops growing he stops progressing and begins to be a "back number." Organization will excite in every member, old and young, a desire to keep on learning more about our profession and its aims. The problems with which we have to deal have gone beyond the point where they can be handled successfully by the individual. We need to unite and work together harmoniously. Organization means the elimination of self and personal aims, and the working together for the good of all. We need to *wake up* if we are to receive the largest reward for ourselves and the community. Or shall we be content to continue in the same old ways? Think of what local clubs, working together for the improvement of its members, would mean in the better service rendered to the public!

The only way for a *successful* oral hygiene movement to be introduced into the smaller places throughout the state is through district societies.

We also have a great deal of undeveloped talent in our younger members. There is little or no chance to develop this in the state society, but it can be done in the *local* clubs, and later made use of in the larger organization.

There should be clubs in every county, not only for the knowledge to be gained, but because you have no idea of the spirit of *fraternity* which grows among the members of the profession when once they have the chance to become acquainted; and let us hope that before another year we may see the organization of many local clubs.

In the state of Ohio there are *twenty-nine* component societies, each one including from one to four counties. At their last state meeting, out of fifty-three clinics, fifty-one were given by members of the society!

Somewhat different from our own, where it is almost impossible to get a member to do anything.

Indiana, Illinois and Oklahoma also have district societies. In Oklahoma there are about four hundred and fifty dentists;

three hundred are members in good standing of the state society.

Dr. C. R. Lawrence, the secretary of the Oklahoma state society, says: "The district society, if properly managed, will double your membership, as it has done with us. If you wish to have a successful dental meeting when you have a small membership, try our postgraduate plan, and you will never regret it."

It is necessary to attend a dental college before beginning practice. It ought to be compulsory to attend the dental society meetings in order to *keep* in practice.

Let each member do all he can to increase the membership, that the society may have the advantage of all desirable candidates. The aim of our society should be, *better individual dentists*, and in a few years we will be able to say: "It pays, and it pays well, to be a member of The Maine Dental Society."

In closing, let us look with respect and reverence upon our predecessors—our fellow-workers of the earlier days, and render to them the homage due for a wise, valiant and successful support of our honored calling. Let us bind ourselves to as zealous, as devoted and as deserving an effort to promote the larger interests which we have and hold by inheritance from them.

ADDRESS DELIVERED AT FIFTIETH ANNIVERSARY
OF THE MAINE STATE DENTAL SOCIETY

June 30, 1915

BY CHARLES M. PROCTOR, D.M.D., BOSTON, MASS.

President Massachusetts Dental Society.

It is with much pleasure that I bring to you to-day the greetings and congratulations of the dental profession of Massachusetts on this occasion of your Golden Anniversary. It is only a year since it was our privilege to participate in a similar festivity; therefore we can anticipate with what pleasure you will enjoy the reflections consequent on fifty full years of active organization.

My presence here to-day is indicative of the closer relationship which has developed among the members of our profession throughout New England during the past few years. There should be at all times a free interchange of thoughts and ideas, together with a strong amalgamation of the personnel of our respective societies for the purpose of unifying our efforts; so to enrich ourselves that we may render large service to humanity and the profession which we represent, should be our constant aim.

It is well to have such anniversaries as you are celebrating to-day, for we find in each a focus of the richest possessions life holds out, compelling us for the time to forget the cares and duties of our daily routine, that we may reflect on the privileges which are ours to enjoy through the unselfish efforts of those who have gone before.

I cannot help but feel that those of you who have passed a majority of years in the active membership of this society have noted with interest and concern the many changes which have taken place in the practice of our profession, and I believe it would not be amiss if I were to pause a moment and enumerate the advantages which we of to-day are privileged to enjoy that our predecessors little dreamed of. We cannot without aston-

ishment behold the present methods of practice as compared with those of one-half a century ago.

It is a well-known fact that in the days of apprenticeship and during the early years of practice of such men as Drs. Jarvie, Bonwill, Jack and Truman, that a dentist's laboratory was his sanctum sanctorum. No man dared to presume on the friendship or acquaintance of another so far to forget himself as to enter the laboratory of another unbidden. Happily for humanity and the profession, those days have passed. Dentistry to-day is an open door to all seekers of the truth. No man who has within his heart a true professional spirit will deny his fellow practitioner any service or information that would result in the ultimate advancement of his profession; and in recent years, as this spirit has become more and more evident, we see on every hand the reflection of it in the high attainment dentistry has achieved for the great cause of humanity. How has this been brought about? Certainly it is not due to any one source or organization, but through the accumulation of individual thoughts and efforts given by the unselfish men in the profession for the ultimate good of the whole.

I am convinced that one of the greatest factors in the advancement of our profession is the closer relationship which has been brought about by the leading men of medicine and dentistry. The time has not been so long since the chief concern of the average medical practitioner regarding oral conditions was either to refer the patient to the dentist for extraction of teeth or remove the troublesome molar with a pair of his own forceps. However, in the march of progress which medicine has made in more definitely distinguishing and differentiating the causes of disease, the physician now appreciates as never before that there are many advantages to be derived by calling in consultation the dental practitioner. He has been forced to realize and quick to grasp the significance of the fact that the septic foci which are found in a very large proportion of cases about the teeth in the form of alveolar abscesses or pyorrheal pockets, contain such micro-organisms as gain easy access to the circulation and the lymph channels, and through them are carried to other parts of the body, inducing systemic disturbances, such

as infection of the kidneys and bladder, of the endocardium, arthritic infections, and with occasional infections of the pleura; and not infrequently have been noted in serious or prolonged illness as the manifestations of general septicemia. The swallowing of germ-laden saliva and food contaminated with such micro-organisms frequently produce a catarrhal condition of the stomach and intestines, and occasionally causes inflammatory changes of the membrane of the common bile duct and, finally, of the gall-bladder.

Röntgenography has contributed mightily in locating the causative factors of systemic disturbances, and those of us who depend upon the Röntgensgram for assistance in the treatment of teeth and for the confirmation of our root work cannot but be grateful for this great help in dentistry.

The theory and practice of prevention in medicine and dentistry has developed with wonderful rapidity the propaganda of Oral Hygiene; appreciating fully the possibilities of the work, it behooves us to anticipate the movement and be prepared for it as it comes to demand our care. The pioneers in oral hygiene, however, have been steadily plodding along, sowing the seed wherever they could, and are at last about to see their efforts arriving at fruition. There is no branch of dentistry which will bring our profession to the eyes of the world as this subject of oral hygiene, and successfully to cope with it, it will be necessary, in order to meet the demands made upon us, that we have adequate trained assistance for this work; there are not enough dentists in the United States properly to care for the curative branch, to say nothing of the preventive side of our profession. By temperament, woman is best fitted for this work of prophylaxis, for to be most effective it must be begun and carried on in childhood; and who better is able by thought, tact and patience to handle the little people who come to our office? It opens an entirely new field for women, and the work they will do will constitute as great a service to our profession as general nursing in its relation to medicine. Undoubtedly many of you know that in Massachusetts we have recently passed a law, after many years of agitation, allowing for such assistance in schools and all public and private institutions. Connecticut, too, has passed

a similar law this year with a broader scope, allowing the dental hygienists to practise under the direction of a registered dentist in his office. It is a question which is demanding the attention of medicine and dentistry throughout the wide world.

Journalism has unquestionably done more in cementing the profession and bringing to the individual members suggestions and ideas, than almost any other one factor. I cannot feel that I would be doing my duty if I did not take this opportunity to say just a word for Independent Journalism in our profession. There has been published for ten years now *The Journal of the Allied Dental Societies*, solely in the interests of the profession. No advertisements of proprietary medicine, tooth paste or washes are allowed between its covers except from such firms who are willing to give their formulæ to the managing editor. Its pages are open to a full and frank discussion upon all subjects pertinent to our profession. This cannot truly be said of some of the trade magazines which have been published in the past; either because of personal ambitions or other reasons, it sometimes happened that a full and frank discussion of both sides of a question has not been published. Therefore I make a plea to those of you who are interested in the upbuilding of your profession to add to your library the volumes of this magnificent magazine; by not doing so, you are losing one of the greatest opportunities for enriching your fund of knowledge so essential to the busy practitioner of to-day. I wish it might be possible that your society would give this journal your active support, paying for such publications as you might issue in it.

Another thought, pertinent along this line, is that it is a source of much regret on going into the offices of many of my colleagues that I fail to find there a library that is in any way comparable to that of our medical friends. It ought to be every man's ambition to own such, and I know of no better way to obtain it than to make it a rule systematically to buy a book once a month, or once in two months, as the case may be. It will bring its reward ten fold for the amount of money expended. A library is the keystone to the arch of our profession. By owning one, we will be more continually reminded of our responsibility, not only in our relationship with our professional brethren,

but to the world as well, for there evolves upon us certain duties which we must ever bear in remembrance, not the least of which is that of continuing our studies in a systematic way on the subjects arising in the profession from day to day.

Bacteriology has played a most important part in dentistry, and we cannot, without astonishment, comprehend how our colleagues of one-half a century ago did without the knowledge to be obtained in this subject. Let us pause for a minute and pay tribute to the late Dr. W. D. Miller, of Berlin, whose memorial will be dedicated this coming December in Ohio. Through him dentistry owes much of its present relationship to medicine; also by his scholarly works the profession has been stimulated to an incentive for higher scientific attainments. Because of this field of study, oral surgery has been developed to a standard little dreamed of ten or fifteen years ago.

Another matter of which I believe we are apt to be neglectful is that of prescription writing. So many men are content simply to prescribe for a proprietary article when many times in the treatment of diseases of the mouth there ought to be a differentiation even in powders, pastes or washes demanding our careful consideration. We can readily see that with a little care and thought a prescription carefully written is far more effective in the treatment of the disease of which the patient is inflicted, and will likewise elevate his respect for us when we are able to give him something more definite than a proprietary remedy.

All these matters which we have discussed are worthy of our consideration, and I feel that on an occasion of this kind it is best to throw the spotlight upon ourselves, and that if we are honest we will take what we know we need and fight on for the cause which we have elected for our life's work.

An anniversary such as this is so suggestive of the greatest gift which is given man to enjoy—that of memory. It stimulates us for the active present and gives us hope for the future; without it life would be a meaningless existence. It enables us to take the basic principles of the materialist and the ethical heights of the idealist and select from the two the practical and human factors of life.

I believe we all agree that the man who so develops his life that it pivots only around the materialist's side is lacking a sense of moral development; and he, too, who sees only the beautiful tints on the distant mountain peaks and fails to discover the beauties around about, is as far away from the true meaning of life as is he who lives for his own selfish aims. Therefore, with the materialist on one hand and the idealist on the other, he is a wise man who can discern the two extremes, and seeing, develop into what all thinking people admire—a personality.

A compass needle seldom marks the north:

The guiding point by which our seamen steer

Lies east or west, swings daily back and forth,

Varies with climes, and alters year by year.

But the true pole, unchanging, shows the way:

To note the compass error on the chart,

To find the deviation day by day;

That brings the ship home! *that's* the sailor's art.

To shape the course, to follow the ideal,

But constantly compare and test the rate

By which it varies from the true and real,

Herein our seamanship is proven great.

LOUIS J. MAGEE.

Personal consciousness is the factor of human life; it is a growth made up of ten thousand fragments, and from it radiate the power of individuality. No one cares for colorless work; people demand that one's product have the stamp of the individual behind it. We desire to know and associate with those who create and execute, while those who are simply content to follow must expect only such consideration as is given to the sutler of the army camp. A house without fixtures or furnishing is no home; but the moment we inhabit it then have we created and established an institution which stands for the welfare and helpfulness of our fellow man.

A society organized as is this, is meaningless unless there is behind it the energy, work and strength of the individual member, and as each endeavors in his way to put forth his mightiest effort, then does it become a monument to society in general.

You have had many such in your roster, men of sterling character and strong personalities, and, Mr. President, I would fail in my privilege if I did not stop and pay tribute to the memory of Dr. Thomas Fillebrown, a truly great man in our profession; he did much for dentistry both in Maine and Massachusetts; his strength of character, his open mind, his love for the righteous things of life, made *his* personality felt with all his associates. Ever ready to assist the young man by his kindly manner and sympathetic advice, and always a good comrade to his more mature friends, his name will go down to posterity as one whose life's work was a monument to humanity. The lives of such men as these are indeed truly exemplified in the spirit of the words of that great poet whose memory you so fondly cherish and whose life was so closely allied to the people of this good old Commonwealth, as well as to those of my own native state, wherein he has written:

Lives of great men all remind us
We can make our lives sublime;
And departing leave behind us
Foot-prints on the sands of time.

AN IMPROVED METHOD OF ANCHORING DETACHABLE CROWNS IN VULCANITE PLATES AND BRIDGES¹

BY FREDERICK H. NIES, D.D.S., BROOKLYN, N. Y.

I invite you to consider earnestly this afternoon a method which I have devised for fastening crowns in vulcanite plates and bridges. The detachable crown is a modification of the English tube tooth exhibited by C. Ash & Son at Boston in 1842, at a meeting of the Boston Surgical and Dental Society. All modern detachable crowns are modifications of this same tooth. Through the courtesy of that company's manager, Mr. Sykes, I am able to show you this original set which some of you may have seen before. In this form the detachable crown was, and still is, used to-day in swaged metal plates of gold and silver. That it might have been used in vulcanite work is also possible although I have been unable in a limited search to find any record of such use. This tooth, known to us in its modified form as a detachable crown, was first placed on the market in sets of fourteen for full dentures by this same firm.

A plate made up of these full bulbous teeth, so like our own, has always a more natural feeling to the tongue than obtains where the vulcanite is carried down to the biting edge on the palatal and lingual surfaces (Fig. 1). As a matter of fact with the old style plates we have been building up an artificial gum on the interior that does not correspond to the natural gum, which by reaching to the cutting edge, destroys the translucency of the porcelain, making it dull and opaque in appearance and far from natural, interfering frequently with incisive articulation and appearing at times distinctly visible in laughing. The full bulbous crown set has none of these shortcomings. The fact that the rubber of the plate is carried only to the basal or gum neck of the tooth instead of down to the biting edge or pin guard means a smaller, lighter plate, more room in the mouth for the tongue

¹ Read at fifty-first annual convention, Connecticut State Dental Association, Hartford, Conn., April 20-22, 1915.



Fig. 1. (a) Full bulbous crown set made up with anchor bar and posts with (b) a cross-pin set made for the same case

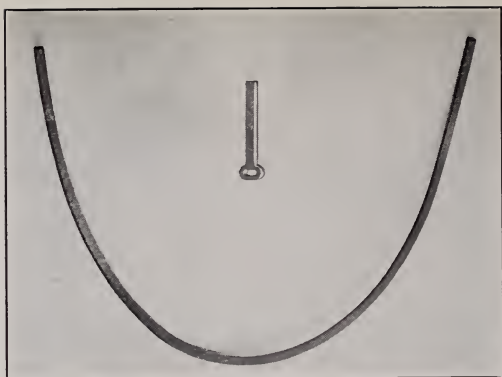


Fig. 2. Anchor bar and perforated post

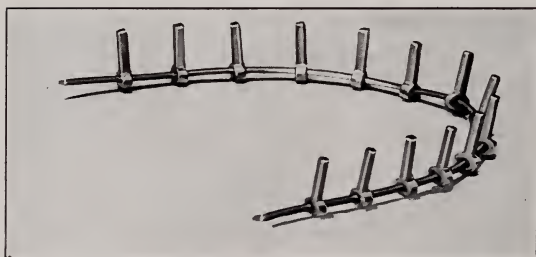


Fig. 3. Posts in position on anchor bar



Fig. 4. Tooth with post in place

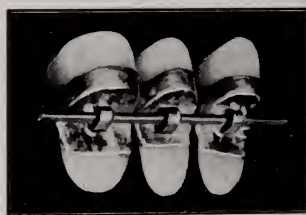


Fig. 16. Anchor bar and posts used with porcelain crowns in bridge work before soldering

and a natural tooth surface for the tongue to press against in articulation, a better surface for separating food, open cleansing spaces, less visible rubber and greater translucency, the teeth lending themselves to irregular arrangement and presenting a more natural appearance.

Answering an inquiry on the subject of full bulbous crowns for dentures, Dr. J. Leon Williams wrote me:

"In answer to yours of yesterday let me say I entirely agree with you as to the beauty and strength of full crowns for denture work. I have said many times during the past few years that in my judgment the denture tooth of the future will be a solid, full form porcelain crown. I am at present engaged in designing something in this line but it will probably be a year or more before they are on the market. I will keep you in mind for some advance forms."

Some years ago I began to use this type of tooth in my practice, but soon found that while the teeth and plate were all I hoped, the teeth needed stronger pins than those furnished, for wherever there was any undue stress the teeth came off, much to my embarrassment, for I had hoped to give my patients the benefit of this improved set. It was at once apparent that in this type of tooth, fastened only at its gum base end, there was greater leverage than had been anticipated by the manufacturers. This type of tooth was attached in two ways, in one a single platinum post was baked in the tooth, as in the S. S. White Counter-sunk tooth; in the other way the tooth was recessed for a post or pin, as are all detachable crowns, and with this crown was furnished an aluminum composition pin with a large head. This pin was set in the crown after the case was flaked and the wax boiled out. The failure of some of the counter-sunk teeth to hold in previous years should have convinced me that these teeth would not stand any undue pressure without breaking out. But the aluminum pin seemed so generously proportioned that I felt that if it did not disintegrate (which it has since done), because made of aluminum, it would take a good deal of stress to pull it out.

Many sets made up of these pins were returned, however, with the teeth off, generally in those cases where a close bite had

left little space for rubber between the model and the base of the tooth. Investigation showed many of the pins intact but pulled bodily out of the plate carrying the vulcanite between the head of the pin and the base of the tooth with it.

Plainly this was a problem that could be met only by providing a much stronger connection between the teeth and the plate without modifying or destroying the useful character of the teeth, yet furnishing additional resistance at the anchorage to the strain exerted on the tooth. To accomplish this end I distributed the strain of each tooth upon the plate, over a much wider area than is possible with the ordinary pins now employed, and the construction is such that the strain on a particular tooth is, to a large extent, distributed over the entire plate.

This was obtained by constructing an anchor bar in the form of a horse-shoe of half round metallic wire on which all the pins were strung and which was itself embedded in the plate parallel to the teeth and ridge.

My first effort (after the teeth were flaked and the wax removed) consisted in burnishing 24 karat gold plate to the base of the crowns, horse-shoe shape. Through this plate I drove 14 gauge gold wire into each crown cutting it off as each post was fitted and waxing it to the pure gold strip, which was removed, invested and soldered. This was a long and tiresome process, so I dropped it only to see it duplicated and published a year later.

My next experiment was to fit 14 gauge wire into each tooth and then bend a gold wire to fit and touch each tooth post, waxing each post to the wire and soldering together at one time. This method also took much time and needed considerable skill to make it accurate. So while meditating over the subject John Carretto, my assistant who co-operated with me in this work, suggested that I bend and hammer a loop at the end of each pin to encircle the wire. This was a good idea and I had a number of sets made up that way. This method also consumed much time and needed much skill to hammer and solder the fourteen loops uniformly. Later I conceived the idea of a perforated pin of a sheet metal stamping, making the pin and loop with a set of dies instead of by hand, thus making them all uniform and

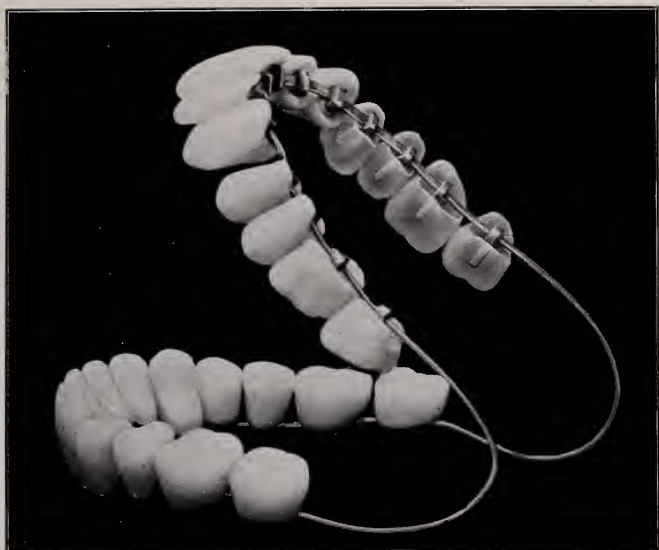


Fig. 5. View of upper and lower set of crowns secured with anchor bar and posts

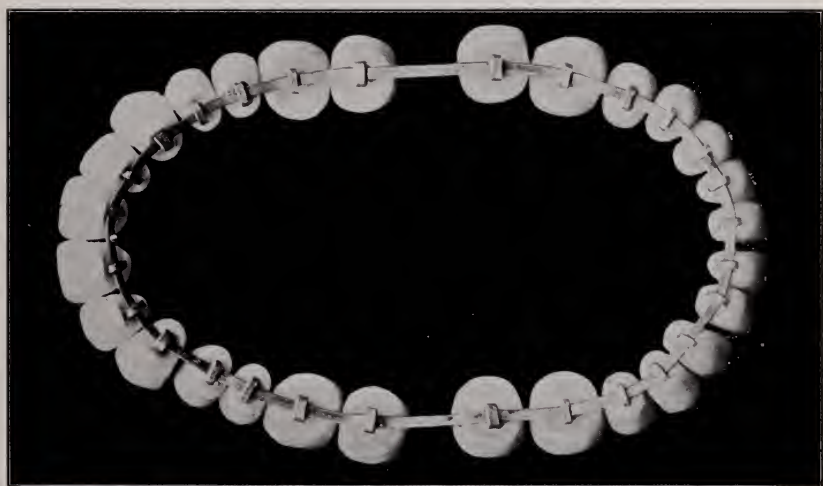


Fig. 6. View of set of crowns fastened with anchor bar and posts
Teeth strung on single bar to illustrate upper and lower



Fig. 7. Upper case invested, with wax removed, ready for anchor bar



Fig. 8. Upper flasked case with posts now on anchor bar ready for packing

perfect, as well as making the whole process one of extreme simplicity.

The post having been perfected, the embedded anchor bar next passed through the usual stages of evolution until a form was devised that would occupy the least space, act as a lock to prevent the post rotating, give the greatest strength, and be adaptable to the varying forms of the gum ridge. The wire that best met my purpose was half-round clasp metal wire gauge 15. I invented and had constructed a special machine to bend this anchor bar so that it could be used in all cases without being touched by any other instrument than a pair of bending plyers to adapt it to the undulations of the model. (My machines for making posts and bending the anchor bar are here on the table.)

As each tooth is ground to the model the post is inserted and the tooth and post waxed in place. When finished the case is flaked and the wax removed. The anchor bar of half-round clasp wire, gauge 15, is now shaped to lie directly over the post holes, the loops in the posts having been gone over to see that they occupy as even a horizontal plane as possible. The fourteen posts are now strung on the bar in their places to fit the teeth to which they are adapted. The post holes in the crown are then partially filled with white rubber or oxyphosphate. Another method is nearly to fill the post holes with whiting—to prevent the red rubber running in—then insert the pins, pack and vulcanize. When finished the teeth are easily removed from their sockets and the holes cleaned of whiting. The teeth are then recemented on the plate. Sulphur, colored red, also can be used for cementing.

The posts strung on the bar are now pressed into each tooth to which they were adapted. The case is then packed with rubber and finished in the usual way. Many plates have been made up in this way in my office and as yet I have not heard of any post breaking.

With the aid of this device, in cases of short lip or a full gum where no artificial gum could be tolerated, full crowns can be ground directly to the gum ridge (Figs. 13, 14). To my knowledge this has never before been possible with full crowns. With this type of case I adopt the additional precaution of soldering the six anterior teeth to the bar for great strength is desirable

(Fig. 16). Repairs will need no vulcanizing. The porcelain will break or shell off before the pins lose their grip or break, or the anchorage yields. If suitable crowns are at hand a plate can be repaired in fifteen minutes or just long enough to grind the new crowns in position and cement with oxyphosphate.

This feature of easy repair without vulcanizing is of inestimable value and profit to us, as well as to our patients in saving the embarrassment of appearing without teeth. The embedded anchor bar also furnishes additional reinforcement for the rubber base and makes that exceedingly strong.

The relative pressure exerted by artificial teeth on a plate denture, we are told by Prof. Gysi, is only one-tenth of that which natural teeth in good condition are capable of exerting. When a pivot tooth of the Davis or Logan variety is mounted on a healthy, natural tooth it would seem to us that this pivot should bear the same stress as a healthy, natural tooth. That it does not I proved by testing numerous incisor teeth, the porcelain of which broke and shelled off the pin at an average pressure of forty-eight pounds. This is the average strength that the porcelain in crowns will stand. Prof. Black showed that natural teeth in good condition are capable of bearing a pressure of from 150 to 250 pounds. The relative strength of the ordinary cross-pin or flat back vulcanite tooth compared with dowel crowns of the Logan, Davis, or Ash variety with pins projecting from their gum base in a longitudinal direction is shown by these tests. If it were not for the soft gum cushion beneath the ordinary rubber plate these cross-pin teeth would break at every bite. To prove this we have but to wedge a single tooth, on a partial denture, fixedly between two natural teeth in a manner that subjects it to the same stress that the approximating teeth stand. To our sorrow we all know how quickly it will break. This is not so of the pivot tooth with its gum base pin. For years we have seen this tooth stand up and do service among natural teeth without breaking, and when breaks do occur, it is largely because the roots have not been properly prepared.

It seems strange that this relative strength between cross-pin teeth and longitudinal pin teeth—although known to most of us—should not have been utilized and found its way into



Fig. 9. Palatal view of finished plate, showing posts and pockets ready for cementing teeth



Fig. 10. Teeth cemented in place on the finished plate

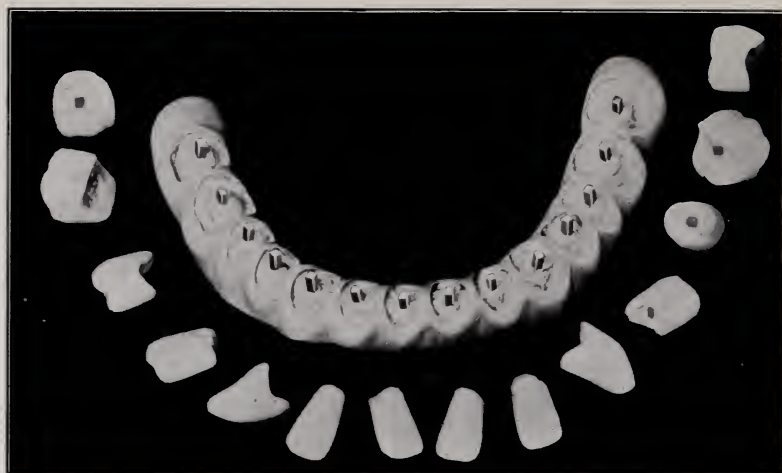


Fig. 11. Lower set with teeth removed ready for cementation



Fig. 12. Lower set with teeth cemented in place



Fig. 17. Front view of Fig. 16 soldered

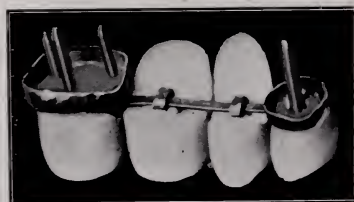


Fig. 18. Iridium platinum posts and anchor bar assembled ready for porcelain



Fig. 13. Set made of crowns with incisors ground to fit against the gum

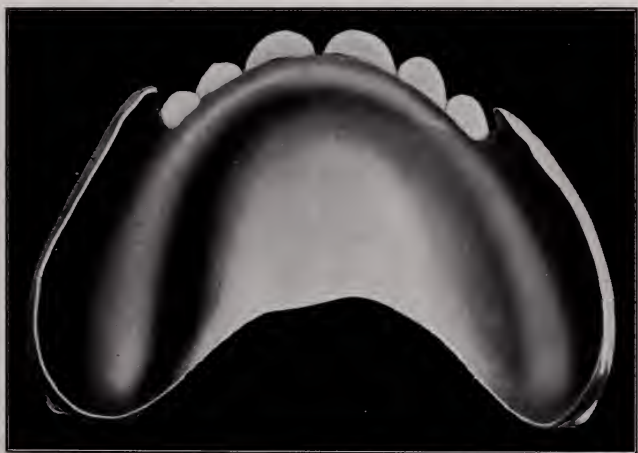


Fig. 14. Back view of Fig. 13

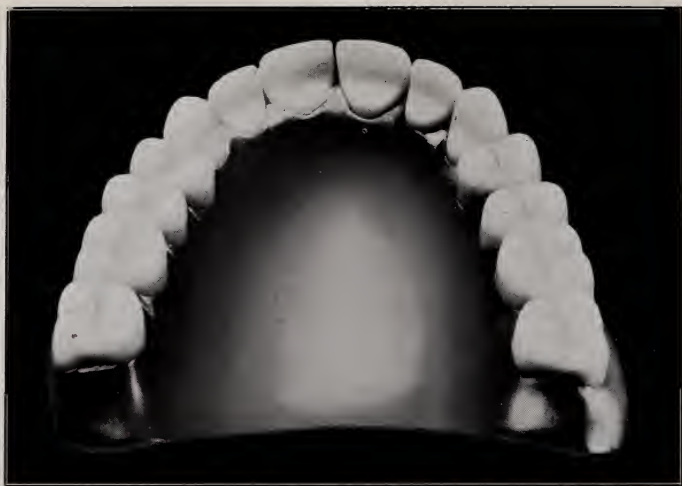


Fig. 15. Palatal view of Fig. 13



Fig. 19. Same model (Fig. 18) with porcelain added

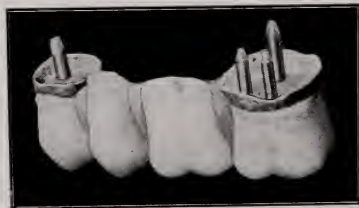


Fig. 20. Finished porcelain bridge

rubber work, although we have seen it for years in English plate work. That efforts were made in this direction is seen in the counter-sunk tooth of the S. S. White Dental Mfg. Co., and a few others that appear in dental magazines. In all of these efforts the pin has been baked in the tooth; the result of this is that the depth of embedment is always problematical, the resistance uncertain and the pin constantly in the way when grinding is necessary. It also is impossible to butt this type of tooth directly against the gum when the fullness of the gum makes a gum block or pink rubber gum impossible.

Wishing to know accurately the amount of strain and stress to which teeth anchored in this way could be subjected and how they compared with other teeth and fastenings, I set about to test in as scientific and thorough a manner as possible the strength of the various types. Securing a Kohlbusch machine, the kind met with at dental exhibits and used by manufacturers of teeth, I began to use it on various makes of cross-pin, straight pin, and flat back teeth. This machine I found useful only for measuring the grip of pins under a straight pull. This would correspond to the extracting of an upper incisor tooth and does not at all reproduce the conditions that exist in the mouth. It seemed to me that the transverse test was the proper one for incisors. It can be likened to the breaking of a rod. Most repair plates show these teeth broken across at the pins. For bicuspid and molars a rubbing compression test comparable to an inverted pestle and mortar seemed proper. I had reached the conclusion that our tests were not what we desired because they simply measured the grip of pins under a straight pull which is not the strain that obtains in the mouth. It was therefore necessary to go over this subject carefully and secure instruments of precision if any were obtainable, and if not to devise a method for applying and measuring the comparatively low stresses to be encountered. It was necessary to devise them.

As the knowledge of the comparative strength of the various teeth manufactured is of much importance to us, I consulted William D. Ennis, Professor of Mechanical Engineering at the Polytechnic Institute of Brooklyn, as a man of wide experience and favorably known in pressure testing. In the experiments

the attempt was made to duplicate approximately the nature of the stress arising in practice. Described from the standpoint of the patient, in an upper denture this is assumed to be an upward and outward pressure divergent from the horizontal line. The machine constructed to produce this condition was a wood frame on which was mounted an adjustable shelf for the plate, a screw for applying the stress and a spring balance for measuring the stress. This was a Chatillon improved spring balance to weigh sixty pounds by two ounces. Stresses were applied gradually in increments of about one-half pound. Plates were set in matrices of plaster of Paris, stresses were applied except as otherwise stated over the whole back of the tooth, the distribution being affected by a rubber interceptor. This rubber interceptor gives a better distribution of the applied load than is the case where concentrated force is used, as might be applied by a point of metal. The leverage of the force applied, of course, varied somewhat with the area of the back of the tooth. The angle of divergence from the horizontal was kept between 15 and 20 degrees.

I gave Prof. Ennis six vulcanite plates to test, five having five teeth and one three teeth. The teeth tested were those made by six of the most prominent manufacturers, and his results were as follows:

Model VI.—Teeth, with composition posts in ordinary use. Stresses at break:

- L. Central, 41 pounds (a tooth of very large area).
- Lateral, 29 pounds.
- Cuspid, 26 pounds.

Average of three only, 32 pounds.

Model V.—Plain rubber platinum pin teeth in ordinary use, cross pin. High plate backing. Stresses at break:

- R. Central, 13 pounds.
- L. Central, 16 pounds.
- Lateral, 13 pounds.
- Cuspid, 16 pounds.
- Bicuspid, 28 pounds.

Average of all, 17 pounds.

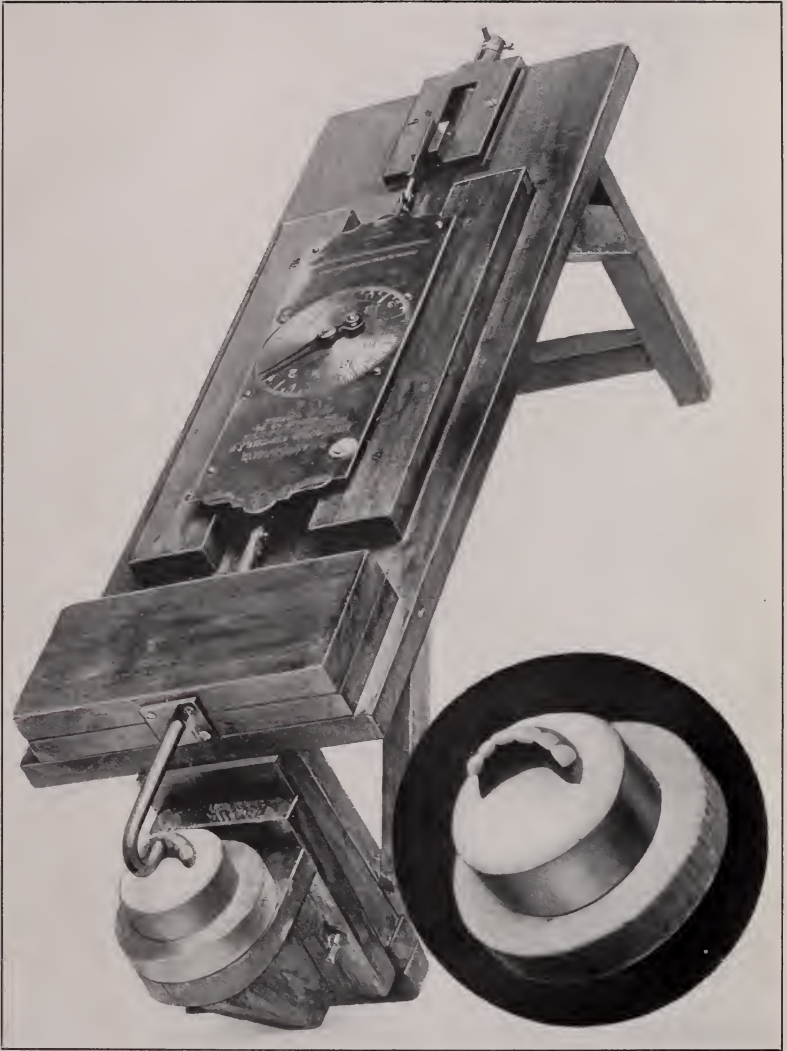


Fig. 21. Machine invented for a new method of testing teeth for transverse breaking stress

Model IV.—Crowns fastened with aluminum-alloyed pins. Stresses at break:

- R. Central, 35 pounds.
- L. Central, 26 pounds.
- Lateral, 39 pounds.
- Cuspid, 36 pounds.
- Bicuspid, 61 pounds. Loosened, did not break.
- Average of above values, 39 pounds.

Model III.—Post teeth, with platinum posts. Baked in the basal surface. Stresses at break:

- R. Central, 23 pounds.
- L. Central, 27 pounds.
- Lateral, 20 pounds.
- Cuspid, 34 pounds.
- Bicuspid, 32 pounds.
- Average stress at failure, 27 pounds.

Model II.—Teeth fastened with anchor bar. Posts nickel, gauge 14. Bar nickel, gauge 15, half round. Detachable crowns. Stresses at break:

- R. Central, 26 pounds. An accidentally poor tooth, the post coming too close to the back, so that it broke through.
- L. Central, 44 pounds.
- Lateral, 44 pounds. Yielded gradually (loosened), but did not break.
- Cuspid, 41 pounds. Broke below top of post.
- Bicuspid, 62 pounds. Loosened, but did not break.

 Average of all, 43 pounds, excluding first 48 pounds.

Plate uninjured. Three teeth broke, two loosened in plate, the posts and anchor bar apparently holding after the tooth itself was broken.

Model I.—Detachable crowns fastened to embedded gold anchor bar. Gold posts, gauge 14. Bar of clasp metal wire, gauge 15, half round. Maximum stresses were as follows:

- R. Central, 45 pounds. Concentrated stress, no rubber interceptor.
- L. Central, 46 pounds. With interceptor without failure; then broke at 42 pounds (face scaled) under concentrated stress.
- Lateral, 42 pounds. Broke off just below top of post.
- Cuspid, 51 pounds. Broke below top of post.
- Average stress at failure, 49 pounds.

 Bicuspid, 62 pounds. Without breaking. Afterward scaled off front at 42 pounds without interceptor.

Plate undamaged. In every case the tooth broke without injuring posts, plate or anchor bar. The mounting is stronger than the tooth itself, although the teeth are among the strongest

tested. For further progress a stauncher material must be found for the teeth themselves.

The figures believed best to represent the average stresses at failure are as follows:

Model III.—Teeth with platinum pins baked in basal surface (for rubber work), 27 pounds.

Model VI.—Teeth with composition posts (for rubber work), 32 pounds.

Model V.—Teeth with platinum cross pins (for rubber work), 17 pounds.

Model IV.—Detachable crowns fastened with composition posts* (for rubber work), 39 pounds.

Model II.—Detachable crowns fastened with gold anchor bar and posts (for rubber work), 48 pounds.

Model I.—Detachable crowns with nickel anchor bar and posts, 49 pounds.

Thus the anchor bar with posts is 50 per cent. stronger than its nearest cross-pin competitor, Model VI.

This method of securing crown teeth will make possible a renaissance of the continuous gum set. When made in this way they are not half their former weight and repair of broken crowns is possible without rebaking the entire piece. I regret that the only set of this kind that I have made was a practical one and I could not separate it from the owner for this meeting.

This attachment is also applicable to bridge work of many kinds permitting the making of all porcelain bridges and affording a great saving of solder on each tooth. I have with me a few specimens. This method has possibilities and in your hands may find new fields of usefulness as yet undeveloped.

REPORTS OF SOCIETY MEETINGS

FIRST DISTRICT DENTAL SOCIETY OF THE STATE OF NEW YORK

February 1, 1915

A regular meeting of the First District Dental Society, S. N. Y., was held at the Academy of Medicine, 17 West Forty-third Street, New York City, on Monday evening, Feb. 1st, 1915.

The President, Dr. S. E. Davenport, occupied the chair, and called the meeting to order.

The paper of the evening, entitled "The Value of a Tooth,"¹ was read by Dr. Eugene H. Smith, Dean of Dental Department, Harvard University.

Discussion on Dr. Smith's Address.

Dr. Oscar Carrabine—Knowing the great affection that the Harvard boys have for Dean Smith, and knowing also that in presenting such a paper in New York he expected to get "shot" by the orthodontists—having regard for that high affection, if I have to shoot him, I am going to shoot him gently.

The Doctor has presented many cases, and by observation—as far as observation goes—the extracting of teeth has improved the occlusion, judging from the models he has shown; but we have not seen the pictures of the patients. We must consider that we are not dealing with irregular teeth; we are dealing with the malformation of the maxillary bones—their lack of development.

When a tooth is extracted there is absorption to the extent of that extraction. The extraction of teeth in orthodontia is an old thing. It was first advocated by Dr. John Hunter in 1778. He advocated extracting the first bicuspid on each side in cases which we call Class II.

I have had some experience in this work,—not a few months,

¹ See Dr. Smith's address in full at p. 331, present issue of THE JOURNAL.

but many years. I am still in process of learning. I have a few slides here, and I will try by kindly argument to show wherein Dr. Smith is wrong.

Dr. John Hunter was the discoverer, by the way, of the normal occlusion of the teeth. He had models made of the teeth in normal occlusion, and in his writings in 1778—fifty years after Fauchard—he advocated the extraction of the bicuspid.

Here is a case (Fig. 1) of the extraction of the first bicuspid. This was practised eighteen years ago, when I first knew Dr. Angle, and he taught me this work. At that time Dr. Angle extracted the bicuspid occasionally, because that was a custom handed down for many generations, and he was convinced that in some cases extraction of the bicuspid was necessary. We practised that, and with this appliance. We used a head gear where the teeth protruded. After taking out a bicuspid—that was before the Baker anchorage—we used occipital anchorage (Fig. 2), using an arrangement that I will show in the next slide, with heavy rubbers pressing on the anterior teeth—pressing them back one space into this position.

Here is a case (Fig. 3, a) taken from Dr. Angle's book, the patient aged seventeen—where the bicuspid were extracted. It was a case of protrusion. The first bicuspid were extracted. The occipital anchorage was used—pressure put on the anterior teeth—and the centrals, laterals and bicuspid moved distally one space. Looking at the models (Fig. 3, b), one would say that is something very fine. But here is the picture of this patient (Fig. 4), which will show something a little different.

After extracting the two bicuspid, using an occipital anchorage, moving the anterior teeth distally, we found we corrected the protruding teeth, and we got a fairly good occlusion; but see where the maxillary bone is (Fig. 3, b). It is distal. We made a worse case of it than it was before, because instead of getting the proper development, we simply moved the teeth back and left the patient in that condition. We saw what a terrible mistake we had made in extracting teeth, simply to get a fine occlusion, without taking into consideration the features of the patient.

In removing any one tooth it leaves a space, and men who

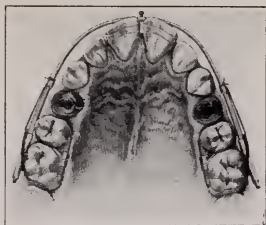


Fig. 1



Fig. 2



Fig. 3, a

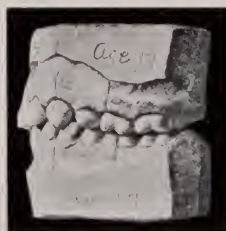


Fig. 3, b



Fig. 4

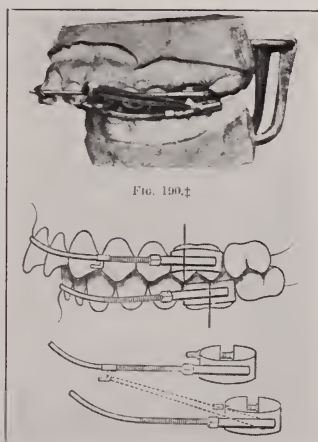


Fig. 190, ‡

Fig. 5



Fig. 6, b



Fig. 6, c

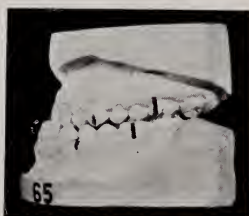


Fig. 6, a

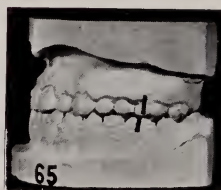


Fig. 7, a



Fig. 7, b



Fig. 7, c

are here who have lost one molar on either side can verify this—that the food will in most cases crowd into that space, and we know the result on the soft tissues.

In moving distally the anterior teeth we have now discarded the occipital anchorage with the heavy rubbers. It was painful and crude. It was irritating to any patient—whether nervous or otherwise.

Another step in the progress of orthodontia, at one time advocated by Dr. Angle, consisted in removing a certain part of the process by cutting through the soft tissues and burring out some of the bone, and moving the teeth in distally. We got the occlusion, as was shown in many of the models of Dr. Smith; but in getting the occlusion we distorted the features in many ways.

This is a photograph of the Baker anchorage (Fig. 5) that Dr. Baker brought out in 1893. This is the improvement that Dr. Angle made, and that little arrangement simply revolutionized orthodontia. Using one arch against the other created an epoch in orthodontia and made it easier and far less painful; and I think those who worked in orthodontia before its introduction can appreciate fully its value.

This is a Class III case (Fig 6, a, b, c) that many members of this society will remember. When the section in orthodontia was begun I took this patient to Dr. Carr's college, took the impression, and we did all this work before the class. I want to show what we did without extracting a tooth, also to show the effect it had on the patient's features.

This is what we did with the teeth (Fig. 7, a). We moved them distally and got a fairly good occlusion, which is very much better now. Many of you have seen this case from beginning to end. All the work was done in the orthodontic section of this society.

This is the young lady (Fig. 6, b, c) as she looked when I began this work. It was impossible for her to masticate her food.

Now in the next picture (Fig. 7, a, b, c) you can see what we did for the patient. If I had extracted a tooth in the lower arch, I could, by moving the teeth one way or the other, get a

fairly good occlusion. But how could I have brought out that part of the face where there was a lack of development if I had extracted a tooth? It took two years to accomplish that result.

To say a tooth should never be extracted under any circumstances would be making an assertion that would not be the truth. I know how difficult it is to save a six-year molar when it is badly broken down. To try to fill the roots before they are fully calcified is nearly an impossible thing. When one is confronted with such a condition it is an unfortunate thing; but what are you going to do? If you devitalize, how are you going to fill those roots to prevent a resorption?

Where it is impossible to save that sixth-year molar, if extraction must be resorted to, I say extract two years, if possible, before the twelfth-year molar will erupt; then in many cases the twelfth-year molar will come in the position of the sixth, and it depends upon the features of the patient whether there is a deformity or not. If there is a receding chin and the sixth-year molar is extracted at any time, the chin will be undeveloped, and it will be a very bad case. It is unfortunate, but some of those things will happen. If you must take out the sixth-year molar, do so two years before the twelfth-year molar comes in; but you are causing a deformity in nearly all cases.

In some jaws extracting a tooth is hardly noticeable; but I say it is best, if possible, to save all the teeth and move them into their correct positions.

Dr. Leuman M. Waugh—It is with considerable timidity that I respond to the call of the President, because I came to learn and had no thought of entering into the discussion. I have jotted down a few notes merely for my own reference, with no thought of systematizing them for discussion.

I believe we all agree that there is but one basis for all dentistry, and that is normal occlusion. I shall endeavor to talk to this subject rather from the standpoint of the general practitioner, if you please, than from that of the orthodontic specialist, because the gentleman who preceded me spoke to it from the latter angle. While I am now giving my full energy to orthodontia, I feel that from the experience I had gained in general

practice I can appreciate the necessity of not losing one's sense of general proportion. Our patients come to us for just a short period from the general practitioner, and it is our duty to return them to the general practitioner, we having done our part in trying to get a normal occlusion, and that it must ever be his duty to retain that normal occlusion in all of the work he does. No matter what special branch we practise, normal occlusion is the one basis; and it applies to the child from the eruption of the deciduous teeth, through mature life, and until in old age, when all resources for conservation of the natural organs have been exhausted, there is still this one principle of normal occlusion that must govern the making of full dentures.

As I view the treatment of the topic, I do not believe the distinguished essayist meant to urge upon us a practice which militates against this basic principle of normal occlusion. There are men in my specialty who say there is no such thing as compromise treatment, and ideally I agree there is not; but no matter how firmly a rule is fixed in the minds of men, we must recognize occasional exceptions which are said simply to prove the rule; and for any man to say that a modified treatment within the limits of good judgment is not sometimes good treatment would seem to me to be foolhardy. Therefore we must sometimes have a compromise treatment to meet special conditions.

In the first slides, which showed the molars so woefully decayed in a child of thirteen, I do not think that, as a rule, the parents who allowed their child's teeth to decay to that stage would have been persuaded to send the child to an orthodontist for a treatment covering so long a time as would be required. So I believe the extraction of those remaining first molars was a practical treatment for such a condition, but surely it cannot be laid down as a principle for practice.

I want to bring out a little different phase from that which has been spoken of—and that is the pathologic side. We must regard bone in the light of newer knowledge, as a living, active, constantly changing tissue. It is not a dead thing, as we find it in the museums or by the wayside. Bone is alive and vital and constantly changing during life, and if we do not have the teeth in relatively good occlusion, so that there is proper support from

proximal contact as well as occlusal inclined planes, there will result a constant abnormal change within the structure of that jaw.

The last picture, in which we saw so much destruction of bone to the lingual of the lateral incisor, is one of the strongest arguments against not maintaining a relatively normal occlusion. There was no history of abscess there, so the destruction of the bone must have some other cause. Every time the jaw was closed an undue strain was brought on that lateral incisor, which brought an abnormal strain on parts of the periodontal membrane. A state of chronic hyperemia was induced, food supply and waste removal were unbalanced, and I believe the destruction of that supporting bone was the result of abnormal or malocclusion.

We have been enabled to view those teeth shown in the slides from only one aspect, and that is from the relationship of a fixed occlusal contact, as viewed from a labial or a buccal aspect. We have not studied changes in the bony structures, but these changes are constantly taking place in your jaws and mine. And then, again, I do not think you or I would relish the absence of proximal contacts with those spaces between our teeth. I know that meat food would wedge down on those gums, and gum tissue cannot remain normal for even a short time under such irritating conditions. I have grown to feel that about 75 per cent. of pyorrhea is due to such conditions of improper proximal and occlusal contact.

The teeth were spoken of as being worn down occlusally to a perfectly flat surface. I do not think the essayist meant that. If he will go to the skull he will not find that to be the case. Have you ever seen it worn exactly plane? When you see these worn down so the occlusal inclined planes are gone and the dentin exposed, the enamel remaining in the grooves and sulci wears slowly and forms ridges, while the dentin cups out, and there is produced an uneven surface which serves quite well for the trituration of foodstuffs.

If we would save the teeth in their fullest efficiency for the greatest number of years, we must have normal occlusion. I think these are slides rather to emphasize the nice results that may sometimes be obtained, rather than average results.

I have had the privilege for a number of years of studying the plaster models made by the students in the freshman class in the University of Buffalo. These plaster models are mounted on the anatomic articulator with the face bow, and if I could bring any fifty of those mounted models before you and show you the woful results, judged from a standpoint of normal occlusion, resulting from the extraction of the first permanent molars, you would not see very many that occlude as well as those shown on the screen. These models have not been put in the anatomic articulator. We have not seen them making their excursions as in mastication, and this would be the only true test. If you could see the the absolute unbalance in the meeting of the inclined planes of these teeth, and contemplate the structural changes that are inevitable in these mouths as the years advance, I do not believe we could agree that compromise treatment is often best in the hands of the average of us.

I believe, with Dr. Angle and others, that the old idea of the large teeth of one parent and the small jaws of the other is erroneous. We must comprehend that the gradual stimulation and development of the jaws in physiologic movement of the teeth will be sufficient to develop a jaw of proper size for the accommodation of all the teeth, and that, did the developing teeth take their proper positions, they would provide the mechanical stimulus necessary for a jaw of proper size. We agree, then, that compromise treatment is sometimes wise, but we should obtain just as nearly normal occlusion as is practicable in each individual case, never forgetting the fact that truly normal occlusion implies a full complement of teeth as Nature intended, and that if we hope to maintain the dental apparatus in health and efficiency for the greatest number of years there must be just as near an approach to normal occlusion as is possible in each individual case, and that all of the teeth must be in harmonious relations for normal occlusion.

Dr. V. H. Jackson—We should thank Dr. Smith for bringing this subject before us. The discussion of these topics is what we need, but I agree with the last speaker and think he has analyzed the matter better than I could.

Before extracting any teeth one should study carefully the

patient's facial lines and those of the parents, always considering the patient's age, and estimate the amount of facial development that will be likely to occur between the time of the patient's visit to us and their adult age of 21 or 22 years. Keeping constantly in mind the family type, the normal type, the proper facial line if all of the teeth are preserved and the effect on the features, if extraction were resorted to. Remembering that the dental arches do not continue their *normal* anterior development to the same extent after the teeth are extracted, although the prominence of the features, as the *nose*, the *malar processes*, the *frontal prominences* and the *mandible* with its mental eminence continue their anterior development until their full adult age.²

There are some cases that amount to a serious problem as to the advantages and disadvantages of extraction. It has been stated that the teeth in the lateral maxillary divisions of the arches cannot be moved backward in the line of the arch, and rather than to have prominent arches, extraction should be resorted to. I should be glad to present plaster models of the arches and models of the features, showing that this is a fallacy, and what can be accomplished in reducing prominent features when necessary by moving both arches backward. There are cases of true prognathism where the molar and bicuspid teeth should be moved distally to reduce the prominent arches, or extraction for the same purpose be resorted to.

In considering this subject a thorough study should first be made of hereditary influences. In the study and practice of orthodontia I do not believe that the influences of environment should overbalance heredity. One should be alert to discover all hereditary conditions and include those of environment.

There are other reasons why we should not extract any of the teeth, as follows:

Extraction always prevents the acquiring of proper and general occlusion of the teeth.

Normal nasal capacity cannot generally be acquired when permanent teeth have been extracted early, or before the arches have reached their full development.

² Jackson, *Orthodontia*, Fig. 14.

The nasal septum usually becomes more crimped or diverted after extraction.

Therefore we should never extract teeth or healthy and serviceable roots of teeth before giving all of these matters careful and proper attention; keeping in mind that with extraction the maxillary facial lines will not develop to the same extent, and at maturity will not harmonize well with the general facial lines mentioned. Knowing these definite plans of nature, we should not permit either arch to remain contracted more than nature intended.

For orthodontic purposes I have not extracted any permanent teeth, excepting supernumerary teeth, for several years. In following out these plans, I would not extract any teeth that can properly be saved. The essayist has shown cases where good results were brought about by extraction.

If the tooth in one arch is removed, the opposite arch will develop more.

In any case the nose keeps on developing, but after extraction the arches would not keep on developing to the same extent, and the features are likely to become considerably unbalanced.

The plan is to watch the case from early childhood and expand the arches if need be at the right time to accommodate all the teeth, and get the proper facial line. Therefore for a considerable number of years I have recommended that teeth be moved to proper position while erupting or as soon thereafter as practicable.

One would not naturally wait until a plant or tree is grown before reshaping it, but would begin to train it to the shape desired while it is in its young and pithy state. In following this plan one should begin early any necessary regulating and get sufficient room for the large permanent erupting teeth, as at this time the arches are in their most developmental stage.

The arch can be expanded while all the deciduous teeth are present, being moved steadily with no discomfort, making space for the large permanent teeth, keeping in mind that the permanent teeth when erupting are as large as they ever will be, and that the apparent excessive expansion of the arches will soon be balanced by the other parts of the features mentioned,

which keep on developing until one has arrived to the adult age.

I think it is the experience of many orthodontists that there are cases of irregularity of the teeth presented where the extraction of one or more teeth would facilitate the regulating and at the same time improve the facial line. This is often the case where promiscuous extraction has previously been resorted to, but if one can watch and control young patients they can usually expand the arches sufficiently to find space for all of the natural teeth. This plan sometimes requires the following up of the regulating for a longer time.

I should like to say a word about the extraction of the impacted third lower molar. The röntgenograms of these conditions are sometimes deceptive, as they often exaggerate the angle of the impacted tooth, and occasionally show an apparent full impaction. One should not be hasty about removing the third molar. We should remember it is the wedging of the permanent teeth that causes the arches to develop. The third molar normally takes its position against the second molar, and the second molar against the first molar, but usually the arches develop sufficiently in time to accommodate all of the teeth. The third molar is often removed for apparent impaction as early as eighteen years. This is wrong and should not be practised, as the arches do not become fully developed until the patient is 20 or 21.

Why does one plan to take out the third molar at any early age, when there is a little swelling and trouble in eruption? The latter is the only means that nature has of destroying redundant tissue to complete the eruption. It is the orthodontist's work to correct the position of the third molar and see that it is preserved when practicable. If one understands the plan he can usually allay the inflammation, preventing infection, and elevate the molar when necessary. Surgery at this stage (first reducing any excessive inflammation by medication), removing some of the soft tissues and of the bone overlying the enamel parts of the molar is advisable, keeping any pockets about the crown medicated when necessary until the molar advances. If it is definitely found that the position of the third molar is such that it cannot be readily elevated by improved orthodontic methods, it should be removed. In the majority of cases a better result is obtained

by tipping upward when necessary and preserving the third molar, in this way avoiding a space that would in after life reflect discredit on the operator.

If the hour were not so late I should like to discuss the plan of controlling the inflammation.

It is important that the general practitioner know the objections to extraction and not remove any teeth that can be saved.

This subject is so important that we should be grateful to Dr. Smith for presenting it before us.

Dr. H. L. Wheeler—I was very much interested in Dr. Smith's remarks. I have known his point of view for some years—I distinctly remember hearing from him in the days of the old Institute of Stomatology. I think Case 24 which he showed may be open to discussion as to whether there was not a pretty certain case of pyorrhea coming on there. I noticed the occlusion was such that there must have been on those anterior teeth an abnormal strain of a type and force that very often does cause considerable trouble from the distintegration of the alveolar process and the forming of pockets.

One swallow does not make a summer, and what Dean Smith said does not mean that he practises extraction in all cases; and there is no doubt that compromise is sometimes a necessity.

I was talking with Dr. Nolan, who is connected with one of the schools in Canada, who is quite an artist. He will sit down and sketch people around him with great accuracy. He understands thoroughly the facial lines and lines of harmony. He makes the criticism that those who are carried away with the idea that you must preserve all teeth to do proper orthodontia make a mistake sometimes. He said he has seen some faces very badly wrecked and badly misshapen and the appearance of the patient injured for life by doing just that thing.

To put it in its simplest form, the plan set for the orthodontist in most cases is to cause a proper growth of the bone for the support of the teeth. There is not a particle of doubt but that the orthodontist who preserved all the teeth and moves them so as to get proper stimulation of the bone, both in the inferior and superior arches, is doing the best he can. Nature never does things twice alike. There are no two things, or two teeth ex-

actly alike. Those things according to geometrical lines may look well on paper, but you cannot always do it. It comes down to the judgment of the man who is doing the operation, and judgment is usually gained by long practice.

There are some patients whose faces will never develop up to what you are striving for; but, on the other hand, some can be developed. You have an expression that is decidedly unpleasant. You have a feeling that the patient is all teeth, and this may be one of the cases where there has been a slight mistake made on the part of the orthodontist. However, those cases are rare, and probably would not make two per cent. of all the cases that come to the orthodontist.

I personally have examined over 1,300 skulls of the prehistoric men—those who lived in this country before it was discovered by the Europeans. They are practically all slightly prognathous, the lower jaw being a bit forward. That was not entirely due to the wearing of the cusps and the surfaces of the teeth. Those people were primitive, and the knife and fork were unknown; and instead of cutting the food and carrying it daintily to the mouth, they bit it off in chunks, and from the coarse food they ate and the cereal which was ground between stones, they acquired the habit of putting the jaw slightly forward to get a good tearing hold on that hard food and meat.

I have never seen a case where the cusps of the molars and bicuspid were worn evenly, as in the mathematical lines laid down by our enthusiastic orthodontists. They are irregular, as Dr. Waugh says. In the older skulls they are worn through, and one might say that they are worn flat. Those old fellows had to do some chewing or go hungry. Their teeth are, I believe, a standing refutation of the ideas put forward by some of the enthusiasts, that if you get a proper occlusion you will always have your occlusal planes and your cusps wearing in geometrical proportion. That is impossible, and it is absurd.

Dr. Smith (in closing)—I am not quarreling with the orthodontist at all, and I agree with all the orthodontists have to offer. I said at the outset that in the orthodontic period I hardly think there is a case where, if extraction were resorted to, it would not be malpractice.

Dr. Carrabine threw on the screen the picture from Dr. Angle's book where the extension wire was used, and the occipital anchorage. That is a case where it is plainly evident that extraction was one of the worst things to do—absolutely no excuse for it. There is never an excuse, even in cases of patients of eighteen or twenty years, with a constricted arch, where you would extract to make room. You can widen the arch even at eighteen or twenty years. I widened the arch at thirty-five years. It is simply in those exceptional cases that occur so seldom.

I believe the ideals of an orthodontist are such that if a student passes through a school of orthodontia and comes only in contact with those ideals, he is unfit to deal with cases that he meets in suburban districts. Most practitioners do not practise in a great city like New York, where there are many able orthodontists to whom a man can turn over such cases. The great majority practise in the country, where the teeth are often neglected. Miss Mary has never thought about her teeth until her people acquired affluence, and she is to be sent to a boarding school. Attention is called to her mouth, which is in a horrid condition and must be put into a condition to make her mouth more attractive. What shall the practitioner do then? It is generally too late to widen the arch and move a tooth here and a tooth there. The young practitioner should be taught to benefit those cases by judicious extraction. Those are compromise cases.

Do not let the orthodontist think the majority of children are being brought to dentists at the age of four or five years. It is not so. I have in my clinic one graduate of the Angle School and one graduate of the Dewey School, and it is interesting to note their development since they have been there. They came imbued with the ideas of Dr. Angle and Dr. Dewey, that extraction was a crime.

They will start to regulate, and they appeal to me as to what they should do in the way of extraction. If extraction is resorted to, it should be before the case is started at all, and not after they have spent time to widen the arches and bring about normal occlusion.

Our young men should be taught something besides the ideals of the orthodontists, unless it is explained to them that in some of the cases compromise may be made.

There is also the problem of the first molar badly decayed. My attention was called forcibly to this last Saturday morning in walking through the clinic. I had lectured from my point of view on the treatment of that first permanent molar. One of my students came to me. He had the rubber dam on a child's mouth, and he said, "Dr. Smith, I wish you would look at this case, which I think is along the line of the talk you gave us this morning." I was pleased at that, and I looked at the case, which was a first permanent molar in a child twelve years of age. Her teeth were in good condition from an orthodontic standpoint. She had a perfect arch, good alignment and good esthetic condition. He was treating this first lower permanent molar, and had been treating it for a week. There was a perforation in one of the roots. Whether he did it or not, I do not know. Students will do those things. Of course, practitioners never do! (Laughter.)

I looked at this case, and one of the young instructors, with that enthusiasm which is a credit to any practitioner of dentistry or medicine to save life, had instructed him with much forethought in the saving of this tooth. I said, "Let us look at the other permanent molars." The first permanent molar on the other side was badly decayed, and the other molars were considerably decayed. I said, "Young man, you are right. That is just a case where this should be done. Take impressions and let us hope we can keep track of this patient and see what will happen."

One may extract molars or bicuspid to make an occlusal balance. It requires judgment, and there are lots of cases that are badly judged; but that does not destroy the principle.

We are sending men out all over the country to deal with cases such as we saw in this clinic, and they should be instructed to deal with them so patients may have good mouths as they advance in years.

I believe in getting these cases as young as you can; but how few of the cases of malocclusion are started at an early age?

They are generally neglected until they are beyond the period of orthodontic treatment. I should like our friends to tell us when and how long is this period for orthodontic treatment. Then something must be done after that period, as a compromise to benefit the appearance and the masticating powers of those mouths.

Another great trouble is the specializing in medicine or dentistry too early in life. No man, in my opinion, should specialize in medicine or dentistry until he has had experience in general practice.

Adjournment.

FREDERICK C. KEMPLE, D.D.S.,
Editor, First District Dental Society.

THE BOSTON AND TUFTS DENTAL ALUMNI ASSOCIATION

ANNUAL MEETING, June 9, 1915.

The annual meeting of the Boston and Tufts Dental Alumni Association was held Wednesday, June 9, 1915. This year the Executive Board had arranged to have a shore dinner, and of the many places suggested the choice was the "Breadencheese Tree Motor Club," Forest Avenue, Cohasset. The choice was a most happy one, and all who attended enjoyed a good time. The majority who went connected with the 9.15 a. m. Nantasket steamer, and a delightful hour's sail landed them at the Nantasket Beach wharf. Automobiles which were there in waiting conveyed the party to the clubhouse in Cohasset.

The business meeting was called to order at 11.15 by the president, Dr. J. L. Taylor. There was quite a bit of business of a routine nature disposed of, and then the new by-laws were discussed. Some portions were eliminated, and others changed, until the entire list was at last acted upon. The call for dinner was heard before the end was reached, so the business meeting was adjourned to the dining-room.

The dinner proved to be a most enjoyable one, from the clam chowder to the cigars. Each lady guest was presented with a box of high-grade candy, this feature making a distinct hit with the "fair sex."

The speaker for the occasion, Joe Mitchell Chapple, M.A., LL.D., editor of the *National Magazine*, was then introduced by the president. The party was entertained in a most efficient manner. The Executive Board is to be congratulated upon securing such a masterpiece in the line of oratory. Mr. Chapple spoke of the many prominent persons he had met, and said the dinner had a peculiar significance for him, as he had lately been on a trip with Champ Clark, Speaker of the House, and it developed that the Speaker's father had been an itinerant traveling dentist in Kentucky many years ago. It was in this intimate conversational way that Mr. Chapple entertained his audience. Many prominent and distinguished men passed

rapidly in review. His description of his trip to the Coronation of King Edward was highly entertaining, and showed to what "length" his native shrewdness had carried him. Taken all in all, it was by far the best after-dinner speech that the society has ever had.

The result of the balloting for officers for the ensuing year was as follows:

President, Dr. Fredk. A. Sawyer.

Vice-President, Dr. P. H. Barton.

Secretary, Dr. H. A. Perkins.

Treasurer, Dr. Geo. H. Payne.

Editor, Dr. A. G. Richburg.

Executive Board: Dr. P. H. Barton, chairman; Dr. J. L. Taylor; Dr. E. W. Moore, Dr. T. H. Moran, and Dr. A. G. Richburg.

The new by-laws provide for the establishment of a permanent fund, which is to result from the payment of fees by the life membership in the society. This fund is not to be used, but the income from same can be utilized at the discretion of the Executive Board. This called for the election of three members to be known as the Trustees of the Permanent Fund. The following gentlemen were chosen Trustees of the Permanent Fund: Dr. William Rice, Dr. W. M. Flynn, Dr. W. I. Brigham.

The By-laws also provide that the vice-president serve as chairman of the Executive Board.

The resignation of Dr. Anne Worthen as secretary was read at the business meeting in the afternoon, and was regretfully accepted. For eight years she has served the association faithfully and in a most efficient manner. It was voted that the association extend to Dr. Worthen a most hearty and appreciative vote of thanks.

The general opinion was that this was one of the best meetings ever held. It was a source of regret that more of the members were not present. There were only 48 at the dinner, including guests. It is to be hoped that another year there will be a larger gathering.

ALFRED G. RICHBURG, D.M.D.,

Editor Boston & Tufts Dental Alumni Association.

THE JOURNAL OF THE ALLIED DENTAL SOCIETIES

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VOL. X

NEW YORK, SEPTEMBER, 1915

No. 3

EDITORIAL DEPARTMENT

ROCHESTER'S TRIUMPH

Another great dental dispensary, comparable with that built and endowed by the Brothers Forsyth in Boston, is to be the gift of George Eastman, in Rochester. A fine building, to cost about \$300,000, equipped in the most complete manner known to science at this day, is to be erected; and, upon the fulfillment of certain conditions¹ already practically met by individuals

¹ See p. 391.

and the city of Rochester, an endowment fund of \$750,000 will be given by Mr. Eastman for its perpetual maintenance. The total investment will be about \$1,200,000. A well chosen Board of Trustees, and the best obtainable personnel in the operative staff, should place this institution in point of public usefulness with the very few of first rank in the world.

Thus another man of public spirit and of vision, with the means to perform the high service of contributing to the health and happiness of coming generations of fellow citizens, has grasped an opportunity lying within reach of similar great men in every city. But it is safe to say, since it is a fact in history, that a benefaction of this nature was not possible previous to the last half decade, and this for several reasons.

Most men who possess the ability to accumulate large fortunes are gifted with much practical wisdom in the matter of investment, whether for personal gain or for the advancement of public welfare. Fortunately the constitutional miser is a rare product in our land of opportunity, where the spirit of democracy is the bottom of our national life. But the philanthropic capitalist usually is "hard headed" in demanding evidence that a certain line of expenditure will bring "results." He very naturally is shy of investments likely to turn out to be of the "blue sky" variety.

Until very recent years it was *not* demonstrated to the man of wealth that the improvement in dental conditions of human beings would profoundly advance

human welfare, for the simple reason that the men best qualified to discover or demonstrate this fact—the dental practitioners—worked in a field but partially known. The steady advancement of medical knowledge, however, has opened a new world of opportunity; and the dentist of to-day finds himself in control of a prime source of disease in the human body. This knowledge is becoming public property, and the well informed men of financial power are not slow in responding to a great need every day more fully demonstrated to exist.

Mr. Eastman's wise liberality will be remembered through generations who knew him not, but while the matter is fresh in the minds of men, let us here record our gratitude to the far-sighted, unselfish and often thankless efforts of those who patiently demonstrated the need which now has been met so splendidly. The years of missionary work undertaken by the Rochester Dental Society leading to this consummation, and the heavy burden of organization now being carried in committee by Drs. W. W. Smith, R. H. Hofheinz, G. G. Burns, and B. S. Hert, must be reckoned as essentially part of this monument to dental science.

Part of the Editorial function, besides "adorning a tale," is to point a moral. Has not the time come for a great dental dispensary and institution of dental research to be established within the city of New York? That the greatest city in the Western Hemisphere should stand to-day with no considerable foundation

for the advancement of dental science is an anomaly which merits heavy and increasing reproach. Columbia University and the Presbyterian Hospital are about to create a new medical school and hospital involving the investment of about fifteen million dollars—the result probably to be the greatest medical center in the world; but as yet the man of great means and of great foresight has not discovered this opportunity to endow a dental institution under the same auspices, which immediately would rank pre-eminent in the dental world. We do not doubt this need will be seen and met in the not distant future.

With the Evan's Institute, the Forsyth Infirmary and now the Rochester Dispensary actually and potentially in being, we may well infer, from the inspiration of these great works, and from the vast fields of untouched possibilities in public dental service, that developments beyond calculation in importance, humanly speaking, soon will come to pass.

THE MAINE DENTAL SOCIETY

THE JOURNAL welcomes heartily a new member in its alliance—the Maine Dental Society. The advent of a new circle of friends may always be counted a bright and cheering sign of progress. It is a vote of confidence and of approval; and when that new impetus is given a project whose source and reason for existence is the advancement of an ethical principle, it is self-evident that the minds of men have been moved by

motives higher than those of practical expediency. In this case we take it as a tangible mark of growth in the sentiment that the records of science shall be made on pages removed not only from the contact but from the suspicion of commercial interests.

In the present case we have directly to thank our loyal and indefatigable friend, Dr. Charles M. Proctor, President of the Massachusetts Society, who in his recent address² at Portland, advocated the action taken by the Maine Society. This is a personal service to professional journalism which deserves to be remembered.

See p. 345.

NOTES ON PRACTICE

COMPILED BY WILLIAM D. TRACY, D.D.S.

Root Canal Preparation.— . . . Whether it be a tooth from which a devitalized pulp is to be removed after arsenical application or pressure anesthesia, or the opening and cleansing of a pulp canal that shows a moist or dry gangrenous tissue, or any of the more numerous pathological pulp conditions beyond the root end; the goal, the strategic point, is the apical foramen or foramina: *foramina* in ninety per cent. of adult teeth. . . .—J. R. CALLAHAN, *Items of Interest*.

Responsibility of the Dentist in Maintaining Oral Health for His Patients.—Very few people keep their mouths as clean as they should or as clean as they think they do. The result is that they harbor vast numbers of germs which may find their way into the crypts of the tonsils, the gastrointestinal tract, the accessory sinuses, and finally breaking down the soft tissues of the mouth, establish there chronic foci of infection. The danger lies in the constancy of the bacterial supply and the strain which it imposes upon the defensive forces of the body. A clean and healthy mouth should be the end of every dental operation. No patient should ever be dismissed until his mouth is clean and he has been most carefully instructed in how to care for it himself. This is said, realizing that it is not always possible to do this, through inability to control all patients, and realizing also that it is the most neglected feature of general dental practice. The "dental hygienist," who thoroughly cleanses the mouths of his patrons, is rendering a far more valuable service than is the dentist, who, neglecting this, makes the most perfect restorations of gold and porcelain. This is the first lesson in the dentistry of the twentieth century. . . .

Necessity for Early Recognition of Pyorrheal Symptoms.—When the dental profession realizes that pyorrhea is a preventable disease; that in its early stages it is easily and permanently cured; that only those cases are hopeless that are long neglected; that no drug or vaccine ever will of itself cure the disease; and that dependence must be placed upon local treatment, they will have taken the first step toward the elimination from the mouths of their patients, the chief of mouth infections.—ARTHUR H. MERRITT, *New York Medical Journal*.

Technique of Entering Pulp Canals.—Paint the floor of the pulp chamber with tincture of iodine. When the surplus iodine is absorbed by a cotton pellet, little dark spots will, in most cases, reveal the location of the canals. The finest Kerr drill, manipulated by hand, without pressure, will enter a very fine canal by gently rotating the drill, and being very delicate and flexible and threaded like a screw, will in most cases bring away the remaining pulp tissue, when the canal may be enlarged by grad-

ually increasing the size of drills, or the drills may be worked in and out of the canals as files.—J. R. CALLAHAN, *Items of Interest*.

Value of X-Ray in General Dental Practice.—I have reached the point where, if my X-ray apparatus were taken away from me, and I could not have it in my own office at my command to use immediately whenever I wanted it, I should give up the practice of dentistry. There is, in my estimation, no branch of the healing art in which the possession of an X-ray outfit in the office of the practitioner, under conditions where he may use it at will during the progress of his work, is of as great importance as in the practice of dentistry.

It is not sufficient that it be around the corner, or even in some other office in the same building, to get the same service. I take exception to the point that is repeatedly made at our meetings that it is unduly expensive. It is not, for the results it provides either for the operator or his patient. In fact, it returns such great value to both that I believe no operator who assumes or claims and sets forth to his patient that he is doing dentistry of a high grade can possibly get along without it. It is an essential part of high-class dental practice to-day.—H. W. GILLET, *Items of Interest*.

Method of Opening Pulp Chamber.—The opening of the pulp chamber should be accomplished with as little disturbance of the devitalized pulp tissue as may be possible: to this end, it will be well to cut through the dentin with a drill, then use carborundum disks and stones, keeping the carborundum stones moistened with water that contains a liberal supply of carborundum powder. This enables the stone to cut rapidly without heating the tooth.

Better results will be obtained if, while using the stones and carborundum powder, all of the tooth crown be removed that interferes with pulp chamber enlargements that may be necessary in getting direct access to the end of the root.

Sufficient enamel and dentin having been removed to give a clear view of the pulp chamber, it will be well to prepare for the placing of the rubber dam, by means of threads, fine polishing strips, separators or by whatever means necessary to insure the dam going to place with little or no forcing. There should be no leakage whatever about any of the teeth included in the field of operation. . . .—J. R. CALLAHAN, *Items of Interest*.

Melting Aluminum.—In melting aluminum previous to casting, new, clean ingots should always be used. The metal should never be overheated, and when fusing, it should be slightly agitated with the end of an ordinary slate-pencil from time to time, and all dross removed, until a smooth, clean surface presents, after which the casting should be made, observing only moderate speed in doing so, as the metal remains liquid for some moments.—H. J. GOSLEE, *Dental Review*.

The Retention and Burnishing of Matrices for Porcelain Inlays.—

In the cavity preparation, I aim to get at least two walls parallel to each other, and when possible, I shape the cavity so that the inlay, when finished, will slide in from only the direction from which the stress of mastication is exerted.

In burnishing the matrix, the platinum is carried to place between two pieces of thin china silk, which enables one to carry the platinum to the bottom of the cavity without tearing it. In burnishing, always begin by using a rotary motion near the margins of the cavity, gradually working down into the deeper portions, or, in other words, sort of spinning the platinum into place. The matrix will sometimes break in the bottom of the cavity or in some important retention angle. These breaks can be patched by placing a small piece of platinum over that portion and burnishing it into place; solder with a small thin piece of pure gold; I use a little piece unrolled from a Rowan's or Pack's cylinder. After soldering, the matrix is carried to place, reburnished and finally swaged to place with sticky wax. The wax is put into the matrix hot enough to stick to the platinum, then allowed to cool to a thick putty consistency, when it is pressed firmly to place. This swages the matrix and eliminates the danger of distortion in its removal. The wax is burned out by laying the matrix on a block of clean charcoal, wax side up, and bringing it to a white heat with a blow pipe. Shellac varnish is used on all margins of the matrix, which, as soon as the varnish is dried, is filled with porcelain and baked.—F. H. SKINNER, *Review*.

Filling Small Root Canals.—There are many canals so small and tortuous that even a fine broach will not enter, to any depth at least. In these cases, after the hemorrhage from the larger canals has been checked and the blood removed, the pulp tissue in the small canals can be disorganized by the use of strong solutions of mineral acids or alkalies. The author prefers making a paste of sodium dioxid and absolute alcohol, placing the paste in the pulp chamber over the small canals, and working it down as far as possible with a smooth broach. The alcohol gradually evaporates, when the sodium dioxid can be decomposed into oxygen and caustic soda by placing a pledget of cotton in the cavity moistened with distilled water. After the reaction has taken place, the alkali can be neutralized with a weak solution of sulphuric acid (two per cent.). This process can be repeated until the desired end is attained. There are other means by which the same results can be accomplished, such as the use of a fifty per cent. solution of chemically pure sulphuric acid, strong solutions of potassium or sodium hydroxid, or a mixture of metallic potassium and sodium (Schreier's paste). These same agents can be used to advantage for the purpose of disposing of a remnant of a pulp in larger canals. It is not safe to anesthetize this remnant by means of pressure. The only cases on record to my knowledge, where toxic symptoms have resulted from the removal of a pulp by pressure anesthesia, followed an attempt to anesthetize a remnant of a pulp or in making the

second application of the anesthetizing solution.—J. P. BUCKLEY, *Items of Interest*. (Dental Review)

Main Points in Treatment of Pyorrhea.— . . . There are three certain, undisputed factors in the treatment of pyorrhea that never can be overlooked in its successful treatment.

1st. The most important symptom to overcome is trauma. All loose teeth that have occlusion are found to possess this symptom. The trauma must be reduced by grinding, and the tooth ligated in such a manner as to insure stable fixation. Until this has been done there will be no progress.

2nd. Hygiene must be taught and established as a habit. The mouth must be made clean.

3rd. All concretions must be removed and all necrotic root surfaces made surgically clean. This must be accomplished by "planing," or "curetting," according to the instruments employed.

When these three things are correctly accomplished, the case will be so far advanced in convalescence that the thought of injecting emetin will not enter the operator's mind.

There is no easy method of curing pyorrhea, but there are some thousands of cases cured each year by scrupulously conscientious operators, who know their subject and who have had sufficient zeal and ability to master the technique necessary to secure results. Cases cured in this manner *stay cured*, as any competent periodontist will attest.—P. R. STILLMAN, *Items of Interest*.

More Time Needed in Using Mouth Washes.—The use of a tooth-wash does not approach the conditions of a laboratory test, though there can be little doubt that a good deal of germicidal work in the mouth is done by the vigorous application of the tooth-brush, and it may be pointed out that the tongue may well be included in the process. To be effective, however, the action of all antiseptics takes time, according to the vitality of the organisms they encounter, and usually the tooth-brushing process does not occupy many seconds. This question of time-exposure is important, but it is very generally overlooked, and consequently the antiseptic treatment of the teeth falls short of that effectiveness which is realized in laboratory experiments. The tooth-washing process should be more prolonged, and the antiseptic wash allowed to remain in contact with the teeth and gums for some minutes instead of seconds before finally washing the mouth clean of the antiseptic with plain water.—EDITORIAL, *The Lancet*.

Sharpening a Scalpel or Lancet.—A quantity of clean beef fat is rendered to common tallow, strained through fine cloth or canton flannel, and while the tallow is in the molten state, No. 1 F carborundum powder is added to make a stiff paste. This paste is spread freely on a smooth strop, which is laid on a table, and the scalpel is drawn back and forth at right angles—not diagonally. This absolutely solves the problem of a keen-edged knife. In cold weather, if the paste is too stiff, a drop or two

of olive oil is added to the paste on the strop. A dull instrument can be sharpened in this manner in one-fourth of the time which sharpening with a stone will require.—V. BERRY, *Surgery, Gynecology, and Obstetrics*.

Teeth Not the Only Source of Oral Infection.—As a matter of fact there are not a hundred germs of human diseases in existence. The number is much less than that, and although almost every germ may be found at some time in the human mouth, we would not find them all together at any one time; nevertheless, there are many that are indigenous to the mouth.

Another thing I think we should recognize is that, while the unclean mouth and teeth are sources of infection, and the danger cannot be overestimated, it should not be forgotten that the tonsils may be a source of infection, and that even a clean mouth provided the tonsils are diseased, may still present a serious source of danger.—S. A. HOPKINS, *Dental Cosmos*.

Importance of Oral Health.—Another thought in connection with the importance of keeping the mouth in a healthy condition. Dr. Dorrance of Philadelphia, who has done a great work in research, found that in cases of tubercular glands of the neck, which were pronounced operable, the simple placing of the mouth in a healthy condition saved eighty per cent. from operation. These are facts that the medical men should understand.—E. KENNEDY, *Dental Cosmos*.

Pain Following Extraction.—When the margins of the wound left after extraction unite very early, the discharges which naturally come away from the granulating surface at the base of the socket have no exit; the consequence is that they are retained, and set up a local traumatic inflammation, which leads to swelling of the surrounding tissue. Such freshly healed surfaces prematurely covering the orifice of sockets must be separated, the sockets syringed out, and a small piece of lint inserted and allowed to remain for about twelve hours. An antiseptic mouth wash should also be prescribed.—J. F. COLYER, *Ash's Monthly*.

Sterilization of Root-Canal Instruments.—The pulp extractors I employ are fitted into slender aluminum handles. Before using they are boiled and placed in test tubes containing a 50 per cent. alcoholic solution of lysol. All bristles, reamers, and drills are also boiled, and kept in suitable containers in a like solution. Broaches and canal pluggers, however, are boiled, dried, and placed in the cabinet, for these may be sterilized without injury by passing them through a Bunsen flame immediately preceding their insertion in a canal. Such a treatment would be ideal in the case of all canal instruments, for everyone recognizes that the drawers of a dental cabinet are far from aseptic. But highly-tempered instruments, of course, such as bristles, pulp extractors, reamers, and drills, would immediately be ruined by coming in contact with a flame.—A. P. LEE, *Dental Cosmos*.

Investing and Soldering Bridges.—There are many materials used in

combination with plaster for investments, such as powdered asbestos, asbestos fiber, marble dust, pumice, white sand, and red birdsand. The latter is very fine and contains a good deal of clay. I know of no better investment than is made from two parts of plaster and one part of this birdgravel. If such an investment is allowed to dry over night, just as the brick and tile makers thoroughly air-dry their materials before firing, it will get very hard, no wiring will be necessary, and there will be no danger of fracture during soldering.—E. L. KANAGA, *Dental Cosmos*.

Adjuvant Pressure Anesthesia in Pulp Extirpation.—In infiltration anesthesia for the extirpation of the pulp in upper molars, it sometimes happens that the pulp in the palatal root retains some degree of sensitivity. It is therefore advisable, in these teeth, either to employ infiltration palatally, or to resort to adjuvant pressure anesthesia. This requires very little more time, and insures entire painlessness, the main object, viz., painless opening into the pulp chamber, which is the part of the procedure most dreaded by the patient, always being obtained by infiltration. The adjuvant application of pressure anesthesia in pulp extirpation is also sometimes indicated when slight sensitivity is left in the root-canal portions of pulps in teeth which have been anesthetized, several at once, by conductive anesthesia, the nerve terminals in the dental pulp seemingly retaining sensitivity the longest. After extirpation of the pulp, which with clever manipulation of the pulp extractor comes away in bulk, the root-canal should be completely cleansed of all the accessory fibrils which can be reached, and dressed with campho-phénique, otherwise sensitivity may be encountered at the next sitting, evidently owing to irritation of the teleneurons remaining vital in the dentin.—R. H. RIETHMULLER, *Dental Cosmos*.

More Than One Method of Anesthesia Necessary.—An exceptionally intimate familiarity with the immense bulk of medical and dental literature on this subject, both domestic and foreign, has convinced me of the correctness of my former statement that "No dental operator who is familiar with but one method should consider himself competent in anesthesia, nor can any dental office which offers anesthetic facilities of but one kind be regarded as efficiently equipped."—R. H. RIETHMULLER, *Dental Cosmos*.

Necessity for Broader Outlook on the Part of the Dentist.—The researches of recent years have compelled attention, first, to the fundamental importance of normal mouth conditions, as bearing upon proper food preparation prior to swallowing; and secondly, the far reaching significance of oral pathology. The adult mouth presents thirty-two distinct possibilities of focal infection, any one of which is competent as the source of secondary infections of the organs directly supporting life. The disease loosely termed pyorrhea—more or less incipient in nearly every adult mouth—is a factor of serious import to bodily health. The dentist's horizon is no longer bounded by the oral cavity; he is seriously engaged in saving and prolonging life, and his field of work is the human body, from the special viewpoint of the mouth.—W. B. DUNNING, *N. Y. Medical Journal*.

CURRENT NEWS

Items of professional news, of general interest, will be welcomed by the Associate Editor at 51 West Forty-seventh Street, New York City.

The following letter was received by the Associate Editor, and we wish to take this opportunity of emphasizing the fact that we are glad to receive items of professional interest for the "Current News" column:

June 27, 1915.

MY DEAR DR. DAVENPORT:

Enclosed is a copy of a letter received yesterday from Dr. Le Cron. I send it thinking it may be of interest to you as editor of *THE JOURNAL*, as well as to your father personally.

With kind regards,

Fraternally,

BURTON LEE THORPE.

Dr. Cron's letter follows:

THE AMERICAN HOSPITAL OF PARIS.

PARIS, FRANCE, June 6, 1915.

DEAR DR. THORPE:

You will note by the above heading that I am connected with this hospital, doing work for humanity and giving my little mite toward relieving the poor suffering French soldiers.

We put in long hours, from 8 a.m. to 6 p.m., seven days in the week; not much play, I assure you. We are all giving our service free and pay our own expenses. I feel I am contributing my part in service rendered, if not in cold cash.

They are trying to get Robert to come over and take my place, as I can't afford to help them any longer, and as they say it is difficult to get men that can conceive ideas for making appliances for fractured and horribly shattered jaws and also to construct them.

Dr. C. W. Roberts, of London, and I work together, and we have had since here 29 cases for fractures and torn out jaws, in two cases the whole chin having been torn away. It is remarkable what restorations we can make, and let me say that the general surgeons here surely appreciate our work and give us due credit for same. This dental department, that was started by Dr. Geo. Hayes and Dr. Wm. Davenport, of this city, will make much new history for dentistry and certainly will cause the M.D.'s to note that dentistry is an honorable and great profession.

Dr. Hayes gives his whole time and Dr. Davenport seven half days a week. They have devoted their time since last September and will continue the good work till the completion of the war.

Although they started with one chair, we now have six chairs and propose putting in four to six more to meet the demands of the wounded of the various nations who are coming in every day. We not only re-

ceive them from our hospital, but ten other hospitals from this city have made application for permission to send jaw cases to our department.

That alone is an open testimony that our work in the dental department is becoming quite well known and the surgeons of the French hospitals are recognizing our department for its good work.

I have written Dr. Don Gallie and Dr. Burkhart and made an appeal for the profession of America to contribute their mite in money to help our department. We get a small portion of the general fund, but so little that we are all obliged to go down in our pockets, besides giving our service and expenses free, to meet the demand.

It is too much to ask from Dr. Hayes, Dr. Davenport and others, who are giving their services, also to contribute money to run the department, and, as it takes quite a lot of money, they are obliged to depend on contributions. All money from dentists should be for the dental department. If sent to the American Red Cross Society, but little good will it do for the dental profession.

Here you see the real horrors of this great war, and you on that side of the pond can't realize the destruction.

This city, once termed "Gay Parrie," now can aptly be termed the City of Mourning. Poor, bleeding France, with its many mutilated young men, sad faced women, in mourning, and fatherless children, makes one's heart sick.

To-day France has over three million of her young men at the front and over two million more in the field drilling and preparing to go to the front at their country's call to fill the vacant places of veterans that have been slaughtered in this terrible war.

It is getting late and I must be off to bed, as I rise at 6 in the morning in order to get to the hospital in time.

My kindest regards to Mrs. Thorpe and best wishes to all the boys.

As ever yours,

D. O. M. LE CRON.

15 STRATFORD PLACE, W. LONDON, ENGLAND.

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THE JOURNAL will be only too glad to receive and be responsible for any contributions to the fund for the American Ambulance Hospital in Paris. Any money sent to THE JOURNAL will immediately be forwarded through J. P. Morgan & Co.

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Much is being heard and read nowadays concerning dental operations performed for the benefit of soldiers and sailors. The present war is showing the necessity of an adequate number of dental surgeons to care for the military and naval heroes.

The *New York Sun* of July 11 printed a short article which stated that "over the Washington-Alaska military cable and by letter have come reports for many weeks that a lot of the United States soldiers at the

Alaska forts have toothaches. The Western department received these reports. It carefully assembled them and forwarded them to Washington, with the first indorsement, to the effect that a soldier with a toothache wasn't of much strategic importance to the U. S. A. The War Department has just ordered Lieut. John H. Hess, dental surgeon, to make the rounds of the forts."

The government is improving its medical facilities in providing dental attention, but it is to be hoped that the condition which limits the forts of Alaska to one dentist for a short time in the spring or summer months may soon be remedied. Authorities are too prone to decide that all troubles connected with the mouth or teeth can be cured by a mere "twist of the wrist" or a "presto chango."

The work performed abroad during the past year should be responsible for great changes in our service.

* * * * *

The education of the prosthetic dentist need no longer be performed entirely by years of instruction in the laboratory. Experience and full knowledge cannot be gained without this long service, but at the present time there are at least two, and possibly more, schools, organized for the purpose of giving courses in Mechanical Dentistry.

The prospectus of one school states that "the course is very inexpensive and interesting, and can be completed in three months time." We do not doubt the interest, but fear that a three months' instruction might leave something to be desired.

Nevertheless, the fact that schools of that character are in existence shows that the masses are demanding and probably receiving better attention from a mechanical standpoint, and it is possible, too, that some valuable ideas might be obtained by laboratory men who have not had long training previously.

* * * * *

The Merchants' Association of New York is attempting to bring pressure enough to bear upon the leaders of the N. D. A. to cause them to choose the big city as the meeting place for 1916.

The Merchants' Association is a powerful organization, composed of sound business men, and we sincerely hope these gentlemen will be successful in what they are striving for. It has been many years since the metropolis has been the scene of the annual national meeting, and we feel that Dentistry, as well as the business men of New York, would reap a distinct benefit if the 1916 gathering should be held in the city that is the world's leader in so many ways.

* * * * *

The Philanthropist of Rochester, N. Y., Mr. George Eastman, founder of the Eastman Kodak Company, has donated what in many respects is a second Forsyth Infirmary, to his city. The new dental dispensary is to be

built and equipped at a cost of approximately \$300,000; Mr. Eastman will contribute \$30,000 a year for five years, and at the end of that time will furnish an endowment of \$750,000 if the conditions have been faithfully carried out; the city of Rochester must provide at least \$12,000 a year for five years to carry on work in the schools, and private citizens must contribute \$10,000 a year for five years for the same purpose.

The new building is to be dedicated to the children of Rochester, just as the Forsyth Infirmary was dedicated to the children of Boston and vicinity by the Forsyth brothers, and the three men who have worked hard for months, who have traveled all over the country studying other dispensaries and who were able so to co-ordinate their ideas and to present their plan to Mr. Eastman in so practical and intelligent a way, that he was moved to make this magnificent gift, are Dr. Wm. W. Smith, Dr. Rudolph Hofheinz and Dr. B. S. Hert, all of Rochester.

The building will be three stories high, of handsome design; it will be provided with every convenience for advanced study and research work; there will be X-ray equipment as well as a surgical department for throat and nose operations; orthodontic work will be a specialty. A large lecture hall will be provided, as well as an attractive amusement room, and the work will begin with approximately twenty competent operators in charge.

There will be a training school for dental hygienists, who later on will do prophylactic work in the schools of Rochester, and there will also be lecture courses for the internes.

Truly dentistry is coming into its own. With the Forsyth and Eastman Infirmaries as examples, it is to be hoped that philanthropists in other cities will in time follow in the footsteps of these revered pioneers.

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Following is the first annual report of the Dental Committee of the Bridgeport, Conn., Board of Health:

TO THE BRIDGEPORT BOARD OF HEALTH:

GENTLEMEN.—On May 1 a report was rendered you of our work from September, 1914, to April 1, 1915, which was the end of the financial year. We now submit an annual report which gives in some detail the work for the entire school year.

The dental corps working in the schools, as you know, comprised eight women prophylactic operators and two women supervisors. The latter part of the second week in April a ninth woman operator was added to the number.

The total number of individual children given prophylactic treatments was 6,768. The number given one treatment was 1,872, the number given two treatments, 2,116, and the number given three or more treatments, 2,780. The total number of prophylactic treatments given was 14,340.

The supervisors gave tooth-brush drills from October to June 20 to 12,546 children.

Stereopticon lectures were given by Drs. R. H. W. Strang and A. C. Fones to 7,447 children.

Ninety-seven individual children who were too poor to pay for dental services were relieved from toothache by Dr. Henry S. Riddell. The operations performed were as follows:

Extractions, 142 teeth.

Treatments, 11 teeth.

Root fillings, 9 teeth.

Cement fillings, 21 teeth.

Amalgam fillings, 1 tooth.

The total cost of this service amounted to \$100.50.

The following table gives the details of our findings of the 6,768 children on the first examination of their mouths:

| State of Teeth | | | Color of Gums | | | Fistulas Showing Abscessed Teeth | Cases of Malocclusion |
|----------------|------|-------|---------------|-----------|------|----------------------------------|-----------------------|
| Clean | Fair | Dirty | Dark Red | Light Red | Pink | | |
| 401 | 2647 | 3720 | 1573 | 4731 | 464 | 691 | 6077 |

| The Use of the Tooth Brush | | | Cavities | |
|----------------------------|--------------|----------|--------------------|--------------------|
| Daily | Occasionally | Not Used | In Temporary Teeth | In Permanent Teeth |
| 653 | 2149 | 3966 | 36700 | 4555 |

The following table is of more interest, as it shows a comparison of the mouths of the 2,780 children who have had three or more prophylactic treatments during the year:

TOTALS OF FIRST AND LAST EXAMINATIONS OF CHILDREN RECEIVING THREE OR MORE PROPHYLACTIC TREATMENTS DURING THE YEAR.

| State of Teeth | | | | | | Color of Gums | | | | | |
|-------------------|------|-------|------------------|------|-------|-------------------|-----------|------|------------------|-----------|------|
| First Examination | | | Last Examination | | | First Examination | | | Last Examination | | |
| Clean | Fair | Dirty | Clean | Fair | Dirty | Dark Red | Light Red | Pink | Dark Red | Light Red | Pink |
| 186 | 1067 | 1527 | 873 | 1769 | 143 | 647 | 1897 | 236 | 273 | 1981 | 526 |
| Fistulas | | | | | | Malocclusion | | | | | |
| First Examination | | | Last Examination | | | 2494 | | | | | |
| 317 | | | 336 | | | | | | | | |

Use of Tooth Brush

| First Examination | | | Last Examination | | |
|-------------------|--------------|----------|------------------|--------------|----------|
| Daily | Occasionally | Not Used | Daily | Occasionally | Not Used |
| 252 | 696 | 1832 | 763 | 1831 | 186 |

| Cavities | | | | Increased Number of Cavities | |
|-------------------|-----------------|------------------|-----------------|------------------------------|-----------------|
| First Examination | | Last Examination | | Temporary Teeth | Permanent Teeth |
| Temporary Teeth | Permanent Teeth | Temporary Teeth | Permanent Teeth | | |
| 15547 | 1027 | 17170 | 1526 | 1623 | 499 |

It will be noted that the increase of cavities in the teeth during the year has been considerably less than one cavity per child. When we consider how easily a decayed tooth will incite decay in a neighboring tooth, we feel that this increase is comparatively small. A large number of the children developed no new cavities.

A number of the teachers have informed us that it is the first year that they have not had a large number of absentees on account of tooth-ache. As time goes on we believe that the physical condition of the children will be much improved and infectious diseases much lessened with clean mouths and sound teeth.

The most important product of our city, barring none, is children. A close study of the first table will convince us that there is much to be done if we would hope to secure health and efficiency for the coming generation.

Respectfully submitted,

F. W. STEVENS, M.D.

R. H. W. STRANG, M.D., D.D.S.

T. A. GANUNG, D.D.S.

W. J. McLAUGHLIN, D.D.S.

A. C. FONES, D.D.S., Chairman.

July 1, 1915.

BOOK REVIEWS

By C. FRANKLIN MACDONALD, D.M.D.

ALVEOLODENTAL PYORRHEA. By Charles C. Bass, M.D., Professor of Experimental Medicine, and Foster M. Johns, M.D., Instructor in the Laboratories of Clinical Medicine at the Tulane University Medical College, New Orleans, La. Octavo volume of 167 pages, with 42 illustrations. Philadelphia and London: W. B. Saunders Company, 1915. Cloth, \$2.50 net.

Endameba buccalis—what a furor this organism has created in the medical and dental world and likewise through the daily press in the world of the lay person!

Drs. Bass and Johns have been among the very first to investigate the endameba in its relation to pyorrhea alveolaris, interstitial gingivitis, or as they suggest, alveolodental pyorrhea. This volume of 167 pages is the first book to appear upon this most vital subject.

The preface at once declares from what standpoint the authors are working, namely, that endameba is the specific cause of this disease, "former theories and ideas as to cause and treatment are left out altogether" and includes the pessimistic statement that "all sooner or later lose their teeth [from it] if they live long enough."

The first three chapters are devoted to a definition of the disease process, a history of endameba and etiology of the disease. The authors feel confident that the endameba buccalis is the *specific cause* of this disease and they do present strong evidence to sustain their views: viz. the constant appearance of these organisms, position in which they are found and their disappearance upon the administration of emetin, a known amebicide. However, they "fully appreciate the fact that Koch's postulates have not been satisfied yet."

The chapter upon morbid process goes into a discussion of the progress of the disease and the pathological changes. The authors believe that normal teeth are self-cleansing and that owing to a kind provision of nature "food forced between them in biting and chewing comes out usually without any effort to remove it being necessary." The authors also say in relation to the occurrence of the disease that "it is unusual to find people over *twenty years* old who haven't *more* than one tooth involved." However, they offer some encouragement to an apparently hopeless situation, because they claim the disease to be "now preventable and curable." Salivary and serumal calculus is formed, so the authors state, in the first case by the pus mixing with the saliva which throws down the calcium salts and in the second case—"certain substances down in the pyorrhea pocket (bacteria and their products), in *certain individuals* cause precipitation and formation of calculi on the roots of the tooth." They say this serumal calculus is "*probably*" a source of irritation. Concerning malocclusion the following odd state-

ments are to be noted: "One of the things formerly thought to be the cause of pyorrhea is malocclusion. Many an unfortunate victim has had his or her teeth ground off by the dentist as a remedy for pyorrhea, exposing sensitive dentin for the balance of the life of the tooth. Instead of malocclusion being the cause of pyorrhea, pyorrhea is the cause of much of the malocclusion seen."

A chapter is devoted to symptomatology, especial attention being called to slight bleeding from the gums as one of the earliest symptoms recognized by the patient.

Under diagnosis, the microscopic examination of material from beneath the gum border is presented as the only positive method of diagnosis.

The chapter dealing with treatment is probably the most important and interesting. Ipecac and its alkaloid emetin are described with the dosage and intervals of administration. Hyperdermic injection is considered the most efficient and best method of administration, although treatment by the mouth, in the form of alcresta ipecac, has met with success in their hands. Local application of emetin solution as advocated by Barrett is considered a helpful adjunct. As to scraping and scaling the roots of teeth the following, a little sarcastic it would seem, is found: "There is a deep set opinion held by the dental profession that it is important to scale or scrape this (deposit) off to facilitate healing." They further say that "the only benefit that would result would be what results from cleanliness and removal of foreign material which *may in some instances be a source of irritation.*" Heavens! What have we here! If the reviewer may express at this point a strictly personal opinion, it is to the effect that the good doctors will never attain nor even remotely approach their *cure* for alveolodental pyorrhea with all their hyperdermic injections of emetin until these insignificant tartar deposits are likewise removed.

In the chapter upon prophylaxis the authors take up arms against the toothpick, floss silk and tooth brush. Little objection will be offered to their condemnation of the toothpick, but their condemnation of dental floss and tooth brush will probably meet with much disapproval. As to dental floss, the following is noted: "Whoever cleaned all his teeth this way without drawing a little blood?"—"We do not believe the use of such means to clean the teeth is advisable." As to brushing, they have not quite the hardihood actually to advocate the non-use of the brush, but they write: "We, therefore, question the advisability of brushing the teeth with a bristle brush for the purpose of removing food particles. In the event it is employed, it should be done with great care." Instead, for the removal of soft tartar and food debris, "a suitable piece of gauze or cloth" is suggested.

Alveolodental pyorrhea is considered to be contagious, and advice is given against transmitting the organisms from mouth to mouth. The local use of emetin in a mouth wash is advocated as a prophylactic meas-

ure against reinfection or the initial infection, if one be so lucky as not to be already infected.

That this book has been written by M.D.'s is immediately apparent. They have written the contents, it would seem, without due consideration for the big subject of normal mouth conditions and for those ideals toward which the members of the dental profession are constantly working. The loss of teeth by alveolodental pyorrhea is a most serious condition, a condition most difficult to combat, and any help toward the alleviation of this scourge is earnestly sought and accepted; but the dentist realizes that caries of the teeth is also a serious menace and must be given due consideration. The authors, apparently, seeing only alveolodental pyorrhea and the endameba buccalis, are anxious to abolish some of the fundamental means for combatting other serious conditions because, theoretically, these things *seem* to be a means for starting up alveolodental pyorrhea. Actual records are conspicuously absent, and only most meager descriptions of conditions of cases with the after results are given.

This book presents practically what the doctors have already published in various papers and some suggestions which will hardly meet with approval from many quarters. The preface says "the book is intended to be of practical use to both the physician and the dentist," and "that many of the more intelligent laymen will find it a convenient source of information." From the standpoint of the discussion of the endameba this book has much of interest and value, but in its present form one could hardly advise that it be placed in the hands of a layman or in the hands of the physician, unless he more properly understands dental conditions than apparently do the authors. If this book goes into another edition, it is to be hoped it will be thoroughly revised and written to a less extent for the general public, but with more records and details of scientific research.

LOCAL AND REGIONAL ANESTHESIA, including Analgesia. By Carroll W. Allen, M.D., of Tulane University, New Orleans, with an Introduction by Rudolph Matas, M.D., of Tulane University, New Orleans. Octavo of 625 pages. with 255 illustrations. Philadelphia and London: W. B. Saunders Company, 1914. Cloth, \$6.00 net; half morocco, \$7.50 net.

Local anesthesia is rapidly establishing itself as an efficient and sufficient means of carrying on painless operations, many of which have heretofore been considered as impossible except under general anesthesia. Dr. Carroll W. Allen of Tulane University has, in this extensive and most interesting volume, presented not only the theoretical possibilities, but also the results of practical clinical work done by himself and Dr. Rudolph Matas for the past few years.

While the author is earnest and enthusiastic concerning the use of local anesthesia, his enthusiasm is kept well in hand and he does not hesitate to state those conditions where local anesthesia has been found inad-

visible, even though possible, and also those circumstances under which general anesthetics serve the purpose best.

The early chapters take up the usual considerations of pain, osmosis and diffusion, and the various agents used to produce local anesthesia, with their dosage and toxicity. As usual, the combination of novocain and adrenalin seems to be considered the most valuable for general use. In the consideration of cocain poisoning the use of ether as a rapid and efficient antidote is presented, its administration by the drop method being all important and only to a mild degree of surgical narcosis.

The author fully recognizes the psychic effect of being fully conscious during an operation of any magnitude, even though no pain is felt, especially to nervous patients. The use of morphin and scopolamin, given hyperdermatically, is recommended to overcome this nervous fear and the author states: "No major operation should be performed under local anesthesia without this preliminary hyperdermic."

The chapter upon anoci-association and the method of combining local anesthesia with light cortical anesthesia is short but most interesting, suggestive of what may prove to be one ideal method for major operations.

The technic of injection into the various portions of the body to produce surgical anesthesia is considered in detail in separate chapters. Considerable regional anatomy is given in the directions for injecting nerves with numerous illustrations and diagrams. The chapter upon the abdomen discusses at some length the still unsettled questions of pain sensations in the abdominal organs, giving excerpts from the researches of Lennander, Ritter and Kast and Meltser. Actual operative cases are recorded and no hesitation is shown in presenting the particular conditions where local anesthesia is not practical nor advisable.

Spinal analgesia is considered at some length, but the attendant dangers make the author claim, after studying the large number of available statistics, that "the method cannot compare in safety at the present stage of its development with general anesthesia." The possibility of this method of anesthesia being of considerable practical advantage in military surgery is just mentioned, and possibly by the next edition, this short half-page may be considerably lengthened. Para-vertebral and parasacral injection, the rather newer methods for producing anesthesia in this region, are taken up in some detail.

The volume closes with a chapter upon the organs of special sense and dental anesthesia. The section upon dental anesthesia is quite complete for a medical book, being in great part derived from a work of Prof. Guido Fischer and it presents his tables of technic.

As an interesting, valuable and sane work upon local and regional anesthesia, this volume has much to recommend it.

DORLAND'S AMERICAN ILLUSTRATED MEDICAL DICTIONARY. A new and complete dictionary of terms used in Medicine, Surgery, Dentistry, Pharmacy, Chemistry, Veterinary Science, Nursing, Biology and kindred branches; with new

and elaborate tables. Seventh revised edition. Edited by W. A. Newman Dorland, M.D. Large octavo of 1107 pages, with 331 illustrations, 119 in colors. Containing over 5,000 more terms than in the previous edition. Philadelphia and London: W. B. Saunders Company, 1913. Flexible leather, \$4.50 net; thumb indexed, \$5.00 net.

This complete and convenient dictionary will be found a source of real satisfaction to the practitioner who keeps in intimate touch with medical terminology. Here he will find the unusual word and the new word, with sufficient information as to derivation, definition, pronunciation, etc., for guidance in practical use. The author states he has purposely avoided lengthy descriptive matter, with a view to retaining the compact character of the book, and he has succeeded in presenting a very great bulk of well-arranged matter in a volume which may be conveniently handled on the desk.

A judicious regard for advances in orthography of scientific terms brings the book well up to date with current literature without running into fads of simplified spelling. Thus, many diphthongs are dispensed with, as in *anesthesia*, *anemia*, *pyorrhea*; the final *e* dropped from *iodin*, *dentin*, *emetin*; but *ph* is preferred to *f* in *sulphid* and similar words. The writer of a dictionary, being largely responsible for usage in orthography, should be conservative in admitting changes, while recognizing the natural growth in the science in which he is authority. Dr. Dorland has chosen his path wisely in this difficult borderland.

The tables and illustrations are copious and clear, the typography excellent, the binding strong but light. As a "work-book" this production well deserves its wide success.

(W. B. D.)

DORLAND'S AMERICAN POCKET MEDICAL DICTIONARY. Edited by W. A. Newman Dorland, M.D., editor "American Illustrated Medical Dictionary." Ninth edition revised and enlarged. 32mo. of 691 pages. Philadelphia and London: W. B. Saunders Company, 1915. Flexible leather, gold edges, plain, \$1.00 net; thumb index, \$1.25 net.

Another edition, the ninth, of the neat, compact and useful American Pocket Medical Dictionary has just been issued. Edited by Dr. Dorland, it continues to be the same complete and carefully considered volume that its predecessors have been.

It seems adequately to cover the ground intended for it; that of presenting a concise, sufficient, but not exhaustive definition of the various terms or words used in medical, dental and veterinary science. The tables of the various arteries, nerves, muscles and the dosage table give considerable information in a brief and comprehensive way.

From the dental standpoint this little book seems quite up-to-date and accurate, although one looks in vain for the definition of the newly coined and now extensively used word—*exodontia*.

For the student and as a handy and quick reference book for the general practitioner this volume meets all demands.

OPERATIVE AND DENTAL ANATOMY TECHNIQS. Classroom and laboratory manual for freshmen dental students. By W. H. O. McGehee, D.D.S., M.D. 12mo, 207 pages. Cloth, \$2.00 net. P. Blakiston's Son & Co., publishers, Philadelphia, 1914.

This book is intended as a handy laboratory manual and as a supplement to the more extensive and elaborate text-books upon dental anatomy and operative dentistry.

The volume opens with a "talk with the student," really a preliminary chapter. It is well thought out and rather a new departure in dental text-books. It contains excellent suggestions as to application, ideals, and especially the advice that a portion of the student's time be devoted to acquiring general information, and it truly says "the man who knows nothing outside of his own calling soon degenerates and becomes small and narrow."

The opening chapter contains a very general description of the human teeth and presents methods and suggestions for drawing tooth forms, for carving teeth in chalk, soap, ivory, etc., and the preparation of various tooth sections.

The second chapter takes up the subject of instruments and appliances, the different instruments are shown with a brief description of the technic of manufacture, their names, uses and methods of handling. Other operative appliances such as clamps, rubber dam, mirror, bars, etc., are likewise considered.

Chapter three deals with the preparation of cavities, being prefaced by the cavity nomenclature as adopted by the Institute of Dental Pedagogics. The preparation of cavities is in general that taught by G. V. Black, with the ideals of extension for prevention, but the thought is conveyed to the student that "there are many conditions, physical and otherwise, which modify the operation of extension for prevention in the mouth." Technic work in cavity preparation, upon the teeth carved by the student, with the various instruments used, is shown in this chapter.

Filling materials are discussed in the fourth chapter, the different kinds, a brief description of each and adaptability to various cases, and the methods of manipulation of each.

A chapter takes up the treatment of pulps and opening and filling of pulp chambers and canals. Here most brief descriptions of some pathological features are presented with the usual methods for the treatment of vital and non-vital pulps. Technic of opening into pulp chambers and canals with subsequent filling, upon teeth mounted in plaster, is presented.

The last chapter is "Suggestions to the Teacher," containing a description of teaching models and presenting methods and ideas for teaching which have been successful in the author's hands. This chapter has things of interest and value to the teacher, but it would seem as if it might well be omitted from those copies intended for student use and only incorporated into a few copies for use by teachers.

This little volume should find a considerable field of usefulness. It

is compact, simple, and contains many practical suggestions for the study of operative dentistry, being especially adapted for beginners in this work.

ESSENTIALS OF ORTHODONTIA. By Van Broadus Dalton, D.D.S., Professor of Orthodontia, Exodontia and Anesthesia, Ohio College of Dental Surgery. 12mo, 103 pages. Cloth, \$1.25 net. P. Blakiston's Son & Co., publishers, Philadelphia, 1914.

Dr. Dalton has attempted in this small volume, almost a pamphlet, to present the essentials of orthodontia, and, as his preface states, "to be an aid and incentive to deeper study and research in this branch of dental science."

The first chapter is given over to the definitions of terms. They are concise and simple statements of the now generally accepted words or phrases used in connection with orthodontia.

Occlusion is very briefly presented, and, as is usual, the Angle classification is utilized.

Under etiology, the most consideration is given to the author's theory of "open bite," which is that "prolonged retention of the second deciduous molars is responsible for this condition of malocclusion in the great majority of such cases," resulting in the "surpra-occlusion of the permanent molars," which "is really the cause of the infra-occlusion."

Facial art and impression and model making are taken up in two short chapters.

The technic of band making with wedging of teeth, hard and soft soldering, and the application of bands and ligation of teeth in certain fracture cases is briefly considered.

Under the heading of methods and appliances the expansion arch only is presented as "the greatest and most efficient single appliance to be found in the whole category of regulating devices." The parts of the new Angle appliance are shown, but no records of actual cases conducted with it are shown. Models and pictures showing a few cases before and after treatment with most brief considerations of the methods of treatment are presented. Only wire ligatures are suggested for ligating; no mention of the now quite commonly used grass line.

Retention and suggestions of a technic course completes the book. Exercises in soldering with the making of various bands and simple combinations for retaining devices constitutes the technic course.

It is hard to classify this book. It does not seem to have sufficient material, especially of a theoretical and general kind, to make it appeal very strongly to those wishing to get a reasonable knowledge of the science of orthodontia, even though they do not practice it, and it certainly does not contain an over-abundance of practical and clinical suggestions for the active orthodontist. As for helping the student, it would seem that its contents could well be imparted in a short lecture course, thus relieving him of the financial burden of another book.

OBITUARY

DEATH OF DR. G. V. BLACK

As we go to press, the very sad news reaches us of the passing away of Doctor Greene Vardiman Black. Limited time and prearranged space prevent the preparation for this issue of an adequate review of Doctor Black's life, and of his varied and great services to dental science and art. A full and authoritative article of this nature will appear in our next number.

Meanwhile, his loss will be mourned throughout the world. An almost personal sorrow will be felt by thousands of practitioners who have been, through a generation, strongly guided and inspired by Doctor Black's teachings. THE JOURNAL is sure it voices the sentiment of unnumbered friends, in its sincere condolence with his afflicted family, and in lamenting the end of a career which was devoted without reserve to the advancement of science.

NOTICES

U. S. NAVY DENTAL APPOINTMENTS

DEPARTMENT OF THE NAVY, BUREAU OF MEDICINE AND SURGERY,
WASHINGTON, D. C., September 2, 1915.

The Editor of THE JOURNAL OF THE ALLIED DENTAL SOCIETIES:

SIR: I am forwarding herewith the latest circular for the information of persons desiring to enter the Dental Corps of the Navy. The next examination will be held at Washington, D. C., on November 29, 1915, and there are at present two vacancies in the Corps.

This circular is forwarded, believing that you might wish to announce the coming examination through the columns of your journal, with some description of the necessary qualifications, and the manner of securing a permit to take the examination.

Very truly yours,

W. C. BRAISTED, *Surgeon General, U. S. Navy.*

CIRCULAR FOR THE INFORMATION OF PERSONS DESIRING TO ENTER THE DENTAL CORPS OF THE UNITED STATES NAVY.

A candidate for appointment to the Dental Corps of the Navy as acting assistant dental surgeon must be a citizen of the United States, between 24 and 32 years of age, a graduate of a standard medical or dental college, trained in the several branches of dentistry, of good moral character, and of unquestionable professional repute.

Should an assistant dental surgeon, Dental Reserve Corps, desire to enter the Dental Corps, he must be between 22 and 30 years of age, a graduate of a reputable school of medicine or dentistry, of good moral character, and of unquestionable professional repute. In accordance with law, however, prior to being commissioned an assistant dental surgeon in the Dental Corps, he must serve three years as an acting assistant dental surgeon, as explained below.

Successful candidates are first appointed acting assistant dental surgeons, and after serving a probationary period of three years are ordered before an examining board to determine their fitness for commission as assistant dental surgeons, United States Navy.

Application should be made to the Chief of the Bureau of Navigation, Washington, D. C., via the Surgeon General, United States Navy, and according to the form prescribed. This application *must be in the handwriting of the candidate* and must be accompanied by the following certificates:

(a) Letters or certificates from two or more persons of good repute, testifying from personal knowledge to good habits and moral character.

(b) A certificate to the effect that the applicant is a citizen of the United States.

(c) Certificate of preliminary education. The candidate must submit a certificate of graduation from an accepted high school or an acceptable equivalent.

(d) Certificate of dental education. This certificate should give the name of the school and the date of graduation.

(e) If the candidate has had special educational or professional advantages, certificates to this effect, signed by the proper authorities, should also be forwarded.

The applicant will save unnecessary correspondence if he will make sure when submitting his application that the qualifications enumerated above are clearly and plainly described in his letters or certificates.

FORM OF APPLICATION.

(This form is not to be filled in here, but copied on a separate sheet in the handwriting of the applicant.)

....., 191

SIR: I request permission to be examined for an appointment as acting assistant dental surgeon in the United States Navy. I was born at, and was years of age on the day of, 191.; am a citizen of the United States, residing in, county of, in the State of I am a graduate of dental (medical) school, in the State of, and was licensed to practice dentistry in the State of in

I forward herewith letters testifying to my moral character, habits, citizenship, preliminary education, professional education, and qualifications.

Very respectfully,

THE CHIEF OF THE BUREAU OF NAVIGATION,

*Navy Department, Washington, D. C. (via The Surgeon General,
United States Navy.)*

A candidate whose qualifications are satisfactory will receive a formal permit to present himself for examination.

THE EXAMINATION.

When a candidate presents himself for examination he must bring with him the testimonials as to character and professional fitness, diploma of preliminary and professional education, and a certificate that he is a citizen of the United States; those forwarded with his application being returned to him for this purpose.

The examination is conducted in the following order: I. Physical. II. Professional. III. Collateral.

I. PHYSICAL EXAMINATION.

The physical examination is thorough, and the candidate is required

to certify on oath that he is free from all mental, physical, and constitutional defects. (Applicants are advised to carefully read the special circular regarding physical qualifications inclosed.)

Acuteness of vision, 12/20 for each eye, unaided by glasses, but capable of correction, by aid of lenses, to 20/20 is obligatory. Color perception must be normal and the teeth good.

If the candidate is found to be physically disqualified, his examination is concluded; if found to be physically qualified, his examination is continued as follows:

II. PROFESSIONAL EXAMINATION.

1. Letter to the board describing in detail his general and professional education.
2. Tests of skill in practical dentistry.
3. Proficiency in the several usual subjects in a standard dental college course.

THEORETICAL (WRITTEN AND ORAL).

Anatomy, physiology, histology, physics, chemistry, metallurgy, dental materia medica and therapeutics, dental pathology and bacteriology, orthodontia, oral surgery, operative dentistry (theory), and prosthetic dentistry (theory).

PRACTICAL (CLINICAL).

Operative dentistry and prosthetic dentistry.

III. COLLATERAL EXAMINATION.

This examination is oral, and is conducted in the following subjects: Arithmetic, grammar, general history, physics, general literature, and Latin.

Applicants holding diplomas or certificates from reputable literary or scientific colleges, normal schools, or high schools may submit such diplomas or certificates for the consideration of the board in this connection.

A successful candidate, upon completion of his examination, will be notified by the president of the board that he has been found qualified.

With the consent of the board, a candidate may withdraw at any period from further examination, and may at a future time present himself for re-examination. The board may conclude the examination (written, oral, and practical) at any time, and may deviate from this general plan as it may deem best for the interests of the naval service.

No allowance will be made for the expense of persons appearing for examination.

The tenure of office in the Dental Corps of the Navy, except in the case of acting assistant dental surgeons appointed for temporary service

only, is for life, unless sooner terminated by removal, resignation, disability, or other casualty.

All officers of the Dental Corps are retired from active service at the age of 64 years, and when so retired (or when retired from active service for disability or other casualty contracted in the line of duty before that age) receive an annual pay for life amounting to three-fourths of the pay of the grade or rank held by them at the time of retirement, including the increased pay allowed for length of service as explained below.

When an officer of the Navy, including dental officers, has been 30 years in the service, he may, upon his own application, in the discretion of the President, be retired from active service and placed upon the retired list at an annual pay for life amounting to three-fourths of the pay of the grade or rank held by him at the time of retirement, including the increased pay allowed for length of service.

Immediately upon official notification of the death from wounds or disease not the result of his own misconduct of any officer of the Navy, the Paymaster General of the Navy shall cause to be paid to the widow, and if no widow, to the children, and if there be no children, to any other dependent relative of such officer previously designated by him, an amount equal to six months' pay at the rate of pay received by such officer at the date of his death, less \$75 to defray expenses of interment; and the residue, if any, of the amount reserved shall be paid subsequently to the designated person. No deduction shall be made on account of expenses of preparation or transportation of the remains.

When traveling under orders by other than public conveyance, officers of the Navy, including dental officers, receive 8 cents a mile to defray the expenses of such travel performed from point to point within the United States, and when so traveling abroad are allowed actual personal expenses estimated on a liberal basis in accord with the position of the officer, both as regards admissible items of expense and the cost of such items.

For every five years' service the pay of officers is increased 10 per cent. (though not to exceed 40 per cent.), calculated on the annual base pay of their grade, as shown in the appended table.

When an officer goes to sea or leaves the continental limits of the United States under assignment to stations or for the performance of other duties beyond the seas, his pay is increased 10 per cent.

When two or more candidates are examined at the same time, their appointments will be in order of merit reported by the board.

Officers of the Dental Corps have the rank of lieutenant (junior grade), and are entitled to all the military courtesies and consideration that go with that rank and are accorded to officers of other branches of the service in a similar grade. They wear the same uniform as other officers of the Navy, with a designating device distinctive of their corps.

PAY AND ALLOWANCE TABLE.

| Length of service. | Allowances | | Total pay and | Pay per annum at sea. |
|----------------------------------|-------------------------|-------------------------|--------------------------------|-----------------------|
| | Pay per annum on shore. | per annum for quarters. | allowances per annum on shore. | |
| First five years' service..... | \$2,000 | \$432 | \$2,432 | \$2,200 |
| After five years' service..... | 2,200 | 432 | 2,632 | 2,420 |
| After ten years' service..... | 2,400 | 432 | 2,832 | 2,640 |
| After fifteen years' service.... | 2,600 | 432 | 3,032 | 2,860 |
| After twenty years' service.... | 2,800 | 432 | 3,232 | 3,080 |

A limited number of acting assistant dental surgeons are authorized by law for temporary appointment when their services are required. Their pay and allowances are the same as those of acting assistant dental surgeons in the regular service. The law provides that these temporary appointments may be revoked at any time, shall have no legal force or effect except for the time the temporary appointee is in active service, and shall include no right to retirement. The requirements for appointment are similar in general to those outlined above. Application for permission to take the examination should be addressed to the Chief of the Bureau of Navigation, Navy Department, Washington, D. C., via the Surgeon General, following the form given above.

For further information address the Surgeon General, United States Navy, Navy Department, Washington, D. C.

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1915

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TRIGEMIN

Analgesic-Sedative

to be used for

Exposure of Pulp

Insomnia due to pain from
irritation of dental nerves.

Migraine

Neuralgia

Pericementitis

Periostitis

Post Operative Pain

Pulpitis



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GREENE VARDIMAN BLACK

THE MAN, AND HIS WORK.

However brilliant it may be in the eyes of men, the reputation of a prophet is uncertain, to say the least; time will show either the truth or the fallacy of what was projected on inspiration alone. But the teacher, though less honored or unhonored, as is often the case, spends his life in patient demonstration, and the magnitude of his work can only be seen in retrospect. The life work of the Teacher is justly honored by Kipling:

Let us now praise famous men—
Men of little showing!
For their work continueth
And their work continueth,
Broad and deep continueth—
Great, beyond their knowing.

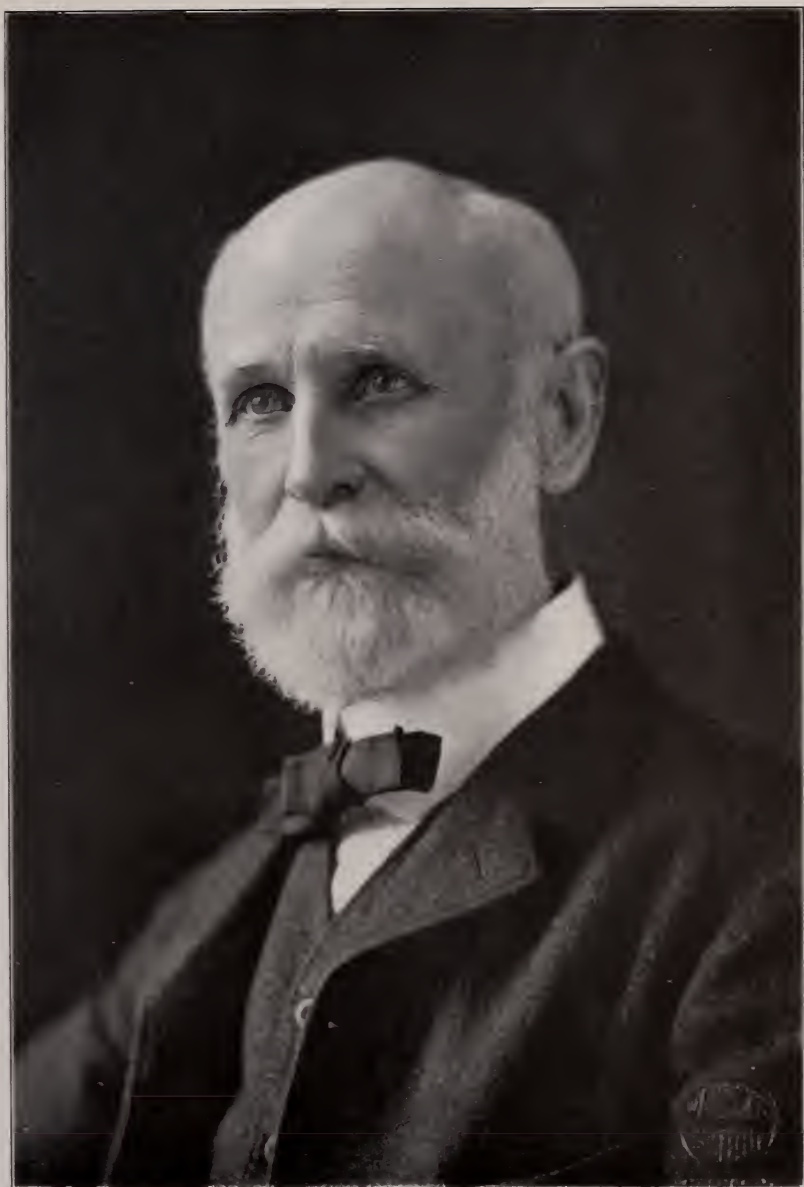
It is a circumstance for which we all may be thankful that Greene Vardiman Black, M.D., D.D.S., Sc.D., LL.D., lived not only to see his teachings accepted as demonstrated truth, but to be acknowledged, by common consent, the leading figure in the slow progress of dental science from artisanship to its present place in the learned professions. Dr. Black's self-effacing modesty removes from the view all vapors of ego, and his work stands clear, as hills in the undiminished light of day.

GREENE VARDIMAN BLACK was born¹ near Winchester, Scott County, Illinois, on August 3, 1836, and was son of William and Mary Black. His great-grandfather was Captain William Black, in the militia of North Carolina, and was one of the first officers to refuse the oath of allegiance to the British crown. Dr. Black's father was born in Milledgeville, Georgia, in 1796; in 1825 married Miss S. Vaughan. In the early thirties they moved to Scott County, Illinois, and later to a farm in Cass County, where the future man of science spent a wholesome boyhood, and where, in later years of stress, he went for refuge and refreshment. His love of the old farm was tenacious throughout life, and he was blessed in ending his days in the home of his boyhood, the house he and his brothers had helped their father to build.²

In those early days he lived much in the open, about the farm or hunting in the wide forest which then existed in that region. He grew up self-reliant and accustomed to hard work, and with the toughness of constitution so necessary for the strenuous future. Here also his love of nature, from daily contact, became perhaps the deepest trait in a many-sided personality. His delight in all matters related to the physical universe—from the habits of an insect to the vagaries of a comet—was never-ending; he was a "born" naturalist. A few Indians remained in that unsettled region, the hunter could still find wild turkeys, foxes, wolves; every man and boy knew the use of firearms. Such a life gave opportunity for his intimate knowledge. In later years, when he had earned something of a reputation as a scien-

¹ Most of the data here presented have been drawn from a biographical sketch in the *Jacksonville Daily Journal*, Sept. 1, which was based on the report of the testimonial banquet to Dr. Black in 1910, published originally in *The Dental Review*; also from the excellent article by Dr. C. E. Bentley in the November issue of *The Journal of the National Dental Association*. The writer is further indebted to Dr. Arthur Black for an intimate view of personal traits of his father, which have not before been published.—EDITOR.

² Even the bricks were "home baked" from a nearby clay bed, and the lumber sawn from the standing timber.



Yours truly
G. W. Black

tist, his brothers recalled his persistent habits of study—of hours spent in watching some insect or animal. Dr. Black's children remember many half holidays when the family went for a drive into the country, always with a few jars or boxes to bring home something from ponds or ditches for microscopic study, or butterflies or bugs, which might be examined with the hand lens and subsequently mounted. So his love of nature became the religion of a life dedicated to science. "Trees—flowers—sky" were the last words he was heard to utter as he became part of the infinite mystery.

Dr. Black began the study of medicine at about the age of seventeen, but before his twenty-first year he had developed a strong mechanical bent, inherited possibly from his father, which determined his choice of dentistry as his life work.

The following summary, compiled several years ago, outlines the leading events of his life:

Family moved to farm seven miles southeast of Virginia, in Cass County, Illinois, in 1845.

Attended country school about three months each winter.

Studied medicine with Dr. Thomas G. Black, a brother, at Clayton, Ill., 1853-1856.

Studied dentistry with Dr. J. C. Speer, Mt. Sterling, Ill., 1857.

Practised dentistry at Winchester, Ill., 1858-1862.

Enlisted in 129th Illinois Volunteers, 1862.

In hospital at Louisville, Ky., six months, and discharged for disability, 1863.

Practised dentistry in Jacksonville, Ill., 1864-1867.

Joined Missouri State Dental Society, 1866.

Joined Illinois State Dental Society, 1868.

First important dental paper on "Gold Foil" read before Illinois State Dental Society, 1869.

President Illinois State Dental Society, 1870-1871.

Invented one of the first cord driven, foot power, dental engines. 1870.

Lectured on pathology, histology and operative dentistry, Missouri Dental College, 1870-1880.

First president of the Illinois State Board of Dental Examiners, 1881-1887.

Wrote book "The Formation of Poisons by Micro-organisms," 1884.

Professor of Dental Pathology, Chicago College of Dental Surgery, 1883-1889.

Introduced teaching of Dental Technics, Chicago College of Dental Surgery, 1887.

Wrote for the American System of Dentistry, chapters on "General Pathology," "Dental Caries," "Pathology of Dental Pulp" and "Diseases of the Peridental Membrane," 1886.

Wrote book "Periosteum and Peridental Membrane," 1887.

Voted life membership in Illinois State Dental Society, 1889.

Professor Dental Pathology and Bacteriology, Dental Department, University of Iowa, 1890-1891.

Wrote book, "Descriptive Anatomy of the Human Teeth," 1891.

Wrote series of articles entitled, "The Management of Enamel Margins," *Dental Cosmos*, 1891.

Professor Dental Pathology and Bacteriology, Northwestern University Dental School, 1891-1897.

Chairman Section on Etiology, Pathology and Bacteriology, World's Columbian Dental Congress, 1893.

Report on Dental Nomenclature, World's Columbian Dental Congress, 1893.

Paper on "Anchorage of Proximate Fillings in Bicuspid and Molars," 1893.

Wrote series of articles entitled "An Investigation of the Physical Characters of the Human Teeth in Relation to Their Diseases and to Practical Dental Operations, Together With the Physical Characters of Filling Materials," *Dental Cosmos*, 1895-1896.

Dean and Professor of Operative Dentistry, Dental Pathology and Bacteriology, Northwestern University Dental School, 1897, to the time of his death.

President National School of Dental Technics, 1897.

President National Dental Association, 1900.

Awarded First Fellowship Medal, by the Dental Society of the State of New York, 1905.

Special Guest at Annual Meeting of American Dental Society of Europe, 1906.

Wrote "Work on Operative Dentistry," in two volumes, 1908.

Dinner in his honor by Chicago Dental Society, attended by 400 representative practitioners from all parts of the country, January, 1910.

Voted Miller Prize for most valuable contributions to dental science and literature by the International Dental Federation, 1910.

Wrote book, "Special Dental Pathology," 1915.

Dr. Black's pre-eminent services to dental science were original investigations, reported in the publications above noted, and

many of his findings were of a revolutionary character. His first notable paper on "Gold Foil" (1869) dealt with the effect of certain gases upon the surface of pure gold, whereby cohesion is prevented; it being then pointed out that when these gases are dispelled by heat, leaving the surfaces clean, perfect cohesion always results. This discovery has had an important bearing upon subsequent advances in filling methods.

His series of articles, published in 1886, on the peridental membrane and allied studies, form much of the foundation of our present-day knowledge. His writings in 1895-96 on "An Investigation of The Physical Characters of The Human Teeth in Relation to Their Diseases and to Practical Dental Operations, Together with the Physical Characters of Filling Materials," made a great stir in the dental world. The famous phrase "extension for prevention" was first used at this time, and led to many bitter controversies, now long ago settled in favor of his main contention concerning cavity preparation. His investigations of dental amalgams, now forming the basis of manufacture, were at this time given to the dental profession, regardless of strong pressure from manufacturers to commercialize his special knowledge.

Dr. Black's books on dental anatomy, operative dentistry and dental pathology stand among the substantial monuments in dental literature.

His literary and scientific interests carried him into other fields, and the following list of unpublished papers³ will indicate his versatility as a writer and original thinker:

Lectures on Zoological Chemistry, comprising 148 pages, Typhoid Fever, The Earth Worm, Man-Representative of the Universe, A Study of the Cicada (seventeen year locusts), The Mechanic Arts of 1776 and 1876. The Pathology of Scarlet Fever, Contractile Tissue, The Development of the Arts, Report on Scarlet Fever, The Basis of Morality, Studies of Fos-

³ C. E. Bentley. *Journal of the National Dental Association*, November, 1915, p. 313.

sil Woods, The Microscope and Its Uses, Inflammation, Progress of Civilization, The Practical Relations of Observation and Thought, Teeth of the Mammalia, A Contribution to the Theory of Sight, The City Waterworks, Waste Products of Thought, The Present Status of the Germ Theory of Disease (1885), Early Diagnosis of Disease of the Kidneys, The Balance of Reason, The Industrial Picture, Sam Marsden's Race for Life (an Indian Story), Influence of the Middle Man in the Formation of Social Castes in America, Manual Training as an Element in Education, Out Sailing, The Man Eater (a story), From Quebec up the Saguenay and Chicoutimi, Report of a Post-Mortem Examination, Our Police System, How to Rest, Anatomy and Physiology as Illustrating the Functions of the Spiritual Man, Studies of Saprophitic Moulds, Not Tides but Barometric Waves (in the great lakes), Chicago Sanitary Canal and Waterway, Social Dangers to Young Men in the Professional Schools.

Dr. Black's avocations were many and interesting. For his summer vacations he frequently chose to go with one or several members of his family, or friends, far away from civilization, into the woods to camp, into the mountains to hunt and fish, or to northern Michigan to sail. He designed and had built a sloop-rigged boat in which he cruised about the Straits of Mackinac and adjacent waters each summer for fifteen years. This boat was named the *Microbe*. It was equipped with government charts of the waters of the great lakes, and his studies of winds and waves and the rules of the sea were as thorough as those of everything else he undertook. He made many trips down the Mississippi to New Orleans. There are few great rivers of this continent which he did not travel. He followed his habit of writing on all such trips, and his unpublished manuscripts contain many interesting incidents of these journeys.

Dr. Black was a lover of music and was himself an accomplished musician. He was a church choir leader for many years. He not only sang well himself, but played the violin and the 'cello, also the cornet, flute and piccolo. Visitors to his home in the evening were often entertained by Dr. Black and his daughters with a program in which Dr. Black's part might consist of Schubert's Serenade on the violin, several of the old songs, as

"Larboard Watch," "Annie Laurie," "Consider the Lilies," "The Land o' the Leal," etc., with a number of 'cello accompaniments to the piano or voices of the daughters.

As an artist, Dr. Black's studies were again such as to place him in an enviable position. His home is decorated with many sketches of landscapes, and several excellent pen-and-ink portraits. The illustrations in the book on "Dental Anatomy," published in 1891, are all by his own hand, and many of them were made in his camp in the northern Michigan woods. The book on the "Periosteum and Peridental Membrane," published in 1887, contains many wonderful pen drawings of microscopical specimens of the various connective tissues. These drawings were reproduced in his work on "Special Dental Pathology," published during the present year. His volumes on "Operative Dentistry," published in 1908, are embellished with hundreds of his original drawings. Among the first of his drawings to be published were a number made in 1871, to illustrate a paper by Dr. T. L. Gilmer on fractures of the jaw. These are to be found in the transactions of the Illinois State Dental Society for that year.

Exactness was ever the watchword with Dr. Black. This trait is not better exemplified than in his work as a machinist and maker of fine scientific instruments. He designed and constructed one of the first cord-driven dental engines about 1870. When he undertook his investigations of amalgams in the early nineties, he required an instrument to measure the shrinkage and expansion of amalgams to the one-twenty-thousandth of an inch, and, after several instrument makers had failed to produce a satisfactory instrument, he went into his own laboratory and constructed one himself. His laboratory was a fully equipped machine shop, and there seemed to be no limit to his ability in this line. His original instruments for registering finger power in the

use of pluggers, mallet force in condensing gold, the force required to chew foods, the results of stress on various filling materials, etc., are all monuments to his genius.

Probably no single instrument has proven of greater value that one designed but a few years ago for grinding microscopic specimens of hard tissues, such as the teeth, calculus, fossils, etc. This machine is so constructed that it may be set to grind a specimen to any desired thinness—for example, to one-thousandth of an inch—and an automatic electric cut-off will stop the machine when the specimen is ground to the thinness for which the gauge is set.

Dr. Black became interested in the study of chemistry and metallurgy at an early day, and for a number of years conducted regular classes among the college and school teachers and physicians of Jacksonville. He also studied astronomy and most of the other sciences. This busy man also possessed a working knowledge of French and Latin, and a thorough knowledge of German.

From an early period he acquired habits of economizing time, which made possible his great thoroughness in carrying a given study to its conclusion before taking up another.

Enough has been said to indicate the scope of Dr. Black's works, of his many interests, and his immense capacity for accomplishment. This rich personality was accompanied by a modesty of bearing which endeared him to all with whom he came in contact. The writer of this sketch well remembers a call he once paid upon Dr. Black at the Northwestern University Dental School. Though a youngster and almost a stranger, the dean's welcome was so kindly that we were apparently old friends in a few moments. Slipping his arm through mine, he took me about the fine infirmary, which he had designed, and pointed out the special adaptations of equipment and lighting; then we went

down a private stair into a little room which he kept for himself—filled with his apparatus, specimens, drawings and models; and there we chatted in the midst of his work. The kindliness of his smile and of his manner, his evident desire to place his new acquaintance at ease, made an impression which has not diminished in the passing of years. Dr. Black has been honored wherever dental science exists, but, what is more, loved by his innumerable friends.

WILLIAM B. DUNNING

"DENTISTRY, A BLESSING AND A CURSE"¹

BY M. I. SCHAMBERG, D.D.S., M.D.

Professor of Oral Surgery of the New York Post-Graduate Hospital and
School of Medicine

In October, 1910, William Hunter, physician and lecturer on pathology to the Charing Cross Hospital, London, and physician to the London Fever Hospital delivered an address at the McGill University, Montreal, on the "Relation of Sepsis and of Antisepsis in Medicine." This masterful presentation published in the January, 1911, issue of *The Lancet* and later quoted in the August issue of *Current Literature*, 1911, created considerable agitation in dental circles owing to Hunter's emphatic statements upon oral sepsis, stigmatizing that which he termed American dentistry. Editorials resentful in tone promptly appeared in many dental journals and Hunter's name was upon the lips of almost everyone who viewed dentistry as a progressive profession and who could not fully appreciate the significance of this keen and observing diagnostician's findings. It took but a short time for the best men in the dental profession to realize that this rebuke, administered in good faith, would work much good in educating the public to the distinction between septic dentistry and dentistry based upon the principles of preventive medicine.

Ottolengui's editorial in the *Items of Interest* in November, 1911, was indicative of the sentiment among the more scientific practitioners relative to this important subject. Yet I am not in sympathy with Ottolengui's soothing reference to the fact that Hunter did not mean American dentistry when he said that "This type of poor dental work conserves the sepsis which it produces by the gold work it places over and around the teeth, by the satisfaction that it gives the patient, by the pride which the dentist responsible for it feels in his 'high-class American work' and by his inability or unwillingness to recognize the septic effect which it produces." For further on he states: "The medical

¹ Read before the First District Dental Society, S. N. Y., Oct. 4, 1915.
See disc., p. 498.

ill-effects of this septic surgery are to be seen every day in those who are the victims of this gilded dentistry—in their dirty-grey, sallow, pale, wax-like complexions, and in the chronic dyspepsias, intestinal disorders, ill-health, anemias and nervous ('neurotic') complaints from which they suffer. In no class of patients and in no country are these, in my observation, more common than among Americans and in America, the original home of this class of work."

Hunter was correct in describing this as typically American dentistry, for it was practised by the vast majority of dental practitioners in this country and though it may not be pleasing to hear, is still practised, in spite of the light that has been thrown upon the grave sequelae of infective foci about the teeth. I will quote Hunter's article freely in this paper, for I consider it a classic upon the subject, and, I am sure, his words, so well chosen, will have more weight than mine in arousing the dental and medical professions to a realization of the benefits to humanity to be derived by giving oral sepsis and infection the attention that it unquestionably demands.

It is not surprising that it is hard to shatter the dentist's faith in his practice of many years, for up until recently he has had no reason to believe that his work was not fulfilling all that was required of it without detriment to the health of the patient; in fact, he had always viewed the restoration of the dental arch and its masticatory function as a means of increasing the longevity and happiness of the human race. It is, therefore, a great shock to hear the frightful accusations made against such an important part of his practice as is embodied in crown and bridge work, and it will take some time to impress some of its strong advocates with the dangers produced by nine-tenths of this work. This, however, is not the only direction in which radical reform measures are necessary for every pulpless tooth, whether crowned or not, and every tooth involved with pyorrhea will require more serious consideration than has been given it in the past.

I am impelled to bring this subject before you with great emphasis owing to the ever-increasing number of pitiable cases that are presenting themselves for treatment at my office and at the hospital clinic. The overwhelming number of patients found

in the medical wards of our hospital, together with the ambulatory cases in our out-patient department, who are suffering from septic absorption from about the mouth and teeth, is but a mere suggestion of what is going on, in and out of other hospitals in this city and throughout the country. One could not see the pathetic cases that apply at the Department of Oral Surgery of the Post-Graduate Hospital without wondering whether dentistry as practised by the mass of dental practitioners does more good than harm. The majority of these poor people, with a death-like pallor upon their faces, are not suffering from want of good food or fresh air, but they are deprived of the type of dentistry that tends to conserve health, and in its stead they pay their hard-earned savings for crowns and bridges that promote and harbor infection responsible for the alarming sequelae about which so much, and yet too little, has been recently written. It is lamentably true that this dangerous type of dental work is not confined to patients in poor or moderate circumstances, but is also found in the mouths of wealthy patients who have expended vast sums of money for what they believed to be perfect dental service.

I want to say to you gentlemen here to-night that about fifty per cent. of my practice is due either to faulty or inefficient dental work. With that thought before you, you can well understand that this appeal for radical changes in dental practice can only be prompted by a philanthropic motive. I would be unworthy of the confidence placed in me as a professional man if I did not exert myself in an attempt to wipe out these evil consequences of dental work, however much my practice would suffer thereby or how unpopular my remarks may be among my dental brethren.

Those of us working upon the border line, so to speak, between dentistry and medicine in the specialty of oral surgery had observed many years previous to Hunter's published views, the close relation between oral infection and systemic disease. At the thirty-seventh annual meeting of the Pennsylvania State Dental Society in Philadelphia, June, 1905, I read a paper on the "Surgical Treatment of Chronic Alveolar Abscess" from which I wish to quote the following statement: "It is difficult to estimate the extent or character of harm that is done the general

system from the ingestion and absorption of pus from the mouth. It, therefore, becomes our duty to cure as promptly as possible all suppurative infections about the mouth. If the usual treatment of a chronic alveolar abscess fails to cure, surgical methods should be employed, and when the condition is found to be such that a cure can be reached in no other way, the tooth or teeth at fault should be removed." I likewise published in that article a number of dental röntgenograms showing infective foci about the teeth.

My methods were looked upon at that time as distinctly radical, for, though root amputation (apicoectomy) with periapical curettement was not a new idea and had been previously written about and practised by M. L. Rhein and others for a number of years, it was not a procedure generally adopted and was exceptionally applied in this country. My agitation of this surgical step toward the removal of infection from the mouth, I am confident, has done some good, for to-day this operation is much more commonly practised by most of the more thorough practitioners. Some idea of the attitude of the more conservative dental teachers may be arrived at by reference to the discussion of the above mentioned paper by an elderly and much revered Professor of Physiology of one of the well-known dental schools, who, when I finished, arose to his feet and said that he had, in his own mouth, several "gum-boils" which periodically discharged into his mouth and that he often expressed the pus from them by pressure upon them with his finger; that he had had knowledge of their presence in his mouth for a great many years and that he had never suffered any indisposition from them and that he considered himself a well preserved and healthy man. I replied to his attempt at minimizing the dangers of these infective foci by stating, in substance, that he was particularly fortunate in having a constitution that up to that time had not been menaced by the infection that was ever present in his mouth and I felt confident that he possessed either a natural or acquired immunity which was in truth his guardian angel. Let that immunity once be broken by the lowering of his resistance, from any cause whatsoever, and it would be difficult to state the amount of trouble that would arise from the infection that was lying dormant for so many years.

The influx into my private and hospital practice of a great many cases exhibiting infection, which I was called upon to treat in a surgical way, gave me an opportunity to observe the remarkable benefit to the health of the individual after the eradication of the local disease. Some of these patients had complained of no definite malady, in fact had considered themselves as well as they could be, except for the disturbance in the mouth, yet, after operation, had voluntarily remarked that they felt even better than before, that they tired less easily and had acquired a certain amount of color in their cheeks and that the improvement was even noticed by their friends and relatives.

In other instances where the patient had had severe gastric or intestinal trouble, or where they had complained of occasional rheumatic or neuritic pains, or where they had severe head-aches or unusual fatigue, or where they had experienced mental depression or nervousness or neurasthenia, or where they had had periodic outbreaks of boils (general furunculosis), etc., they most often have shown a marked improvement, if not a complete disappearance of a condition that they never dreamed had any relation to the disease which I was called upon to treat. I have likewise handled many cases of pyorrhea and periapical infection associated with diabetes, with patients running a temperature of unknown origin and with patients exhibiting high blood pressure, in which they have been markedly improved after the mouth condition had been successfully treated. In the diabetic patients, the glycosuria would almost invariably be reduced with the disappearance of pus from the mouth. It is likewise astounding to see the number of grave anemias and cardiac lesions that, if carefully studied, are traceable to focal infections. I could cite many cases illustrating this point but there are more important matters to be considered at this time.

It is my belief that the mouth is more frequently the seat of the primary infection that brings about these secondary or metastatic conditions than all the other parts of the system grouped together. This conforms with Hunter's views, for he says: "My clinical experience satisfies me that, if oral (and nasopharyngeal) sepsis could be successfully excluded, the other channels by which 'medical sepsis' gains entrance into the body might be

ignored. Sepsis as an important and prevalent cause of disease in medicine would almost cease to exist, instead of being, as in my judgment it is at the present time, a more important and prevalent cause of disease in the domain of medicine than it is in that of surgery. One of the worst cases of sepsis I have ever seen was brought to me by a doctor who told me the mouth had been 'carefully seen to and was in good order.' The patient was a tall, handsome man in the prime of life—a case of severest Addisonian, so called 'pernicious,' idiopathic anemia. His mouth was indeed clean to all outside appearances, for it was one mass of gold caps, bridges, crowns, fillings, false teeth, etc., so ingeniously built up that one could hardly tell what was false and what was real. To free that man from his sepsis in his state of health involved what was really equivalent to a major operation in surgery. The conditions of sepsis, necrosis, etc., revealed on removal of the golden architecture were perfectly appalling. I speak from experience. The worst cases of anemia, gastritis, colitis of all kinds and degrees, of obscure fever of unknown origin, or pupura, or nervous disturbances of all kinds, ranging from mental depression up to actual lesions of the cord, of chronic rheumatic affections, of kidney disease, are those which owe their origin to, or are gravely complicated by, the oral sepsis produced in private patients by these gold traps of sepsis. Time and again I have traced the very first onset of the whole trouble of which they complained to a period within a month or two of their insertion. There is no rank of society free from the fatal effects on health of this surgical malpractice."

The wonderful experimental work done by Rosenow upon lower animals in which he was enabled to produce gastric and duodenal ulcers by the intravenous injection of streptococci and his further contributions to medical science in connection with the etiology of arthritis deformans, endocarditis, rheumatism, etc., tend further to connect the chain of evidence between cause and effect.

It is indeed unfortunate that most members of the dental and a good proportion of the medical profession view this subject with a good bit of skepticism, for those of us who have been intimately associated with this work can no longer be in doubt over the defi-

nite relation that exists between mouth infection and systemic disease. It is immaterial whether the organisms found in the lesions about the teeth are directly or indirectly responsible for the more grave disease in the parts remote from the oral cavity. They are nevertheless a potent complicating factor which oft-times tips the scale of the patient's chances, thus precipitating a fatal termination. It is a most usual clinical occurrence in the myelogenous and lymphatic leucemias to find an ulcerous or gangrenous involment of the buccal mucosa adjacent to the teeth, manifesting itself immediately prior by a couple days or a week or so of the termination of the case. It appears almost as though nature was pointing in index-finger fashion to the seat of the culprit that brought about the much dreaded blood disease.

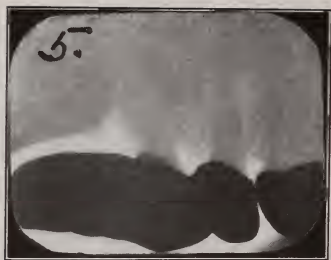
At the present time, we have a patient with myelogenous leucemia dying in the hospital and, within a month, I have seen several other cases of lymphatic leucemia with oral manifestation. One had been sent to my office with a gangrenous patch in the mouth which I observed for several days and then pronounced the case one of lymphatic leucemia, even before the blood picture verified my diagnosis. The patient was sent to the hospital, the family was notified of the grave nature of the disease and the patient succumbed, as do most of them, shortly after her admission.

It will not be my purpose to make this paper technical, for I desire that it should be, as the title would indicate, more in the nature of a sermon. I cannot refrain, however, from referring to several marked illustrations of the dire results of bad dentistry. Together with reference to these cases, I will throw upon the screen some röntgenograms illustrating the types of lesions about the mouth responsible for the graver maladies referred to, after which my conclusions, with suggestions for the remedy of this colossal subject, will indicate the character of dentistry which can indisputably be considered a blessing.

A woman about 35 years of age who had been an invalid for fifteen years and who had not been able to walk for five years, owing to a pronounced case of polyarthritis, was carried into my office upon a sedan chair by two negroes for the purpose of having her mouth examined to locate a possible seat of infection that might have some bearing upon her malady. The patient was in a piti-



Röntgenograms Nos. 1 and 2 illustrate infective foci about the teeth that were responsible for marked cases of polyarthrititis. Nos. 3, 4, 5, 6 and 7 show samples of crown and bridge work put in the mouth of a wealthy patient at great expense by a dentist who posed as her benefactor. The infection found about all this constructive and destructive dental work converted this woman from a healthy being into an invalid, and the patient was later restored to good health by the removal of all this dental work and the surgical eradication of the larger areas of bone involvement. No. 8. Periapical infection in a patient suffering from anemia. No. 9. Pyorrheal pockets in the mouth of a patient who suffered from rheumatic attacks as well as gastro-intestinal disturbances.



able state with enlargement of the joints of both upper and lower extremities and with marked atrophy of the muscles from non-use, for she had but partial control over her arms and no control over her legs. I learned that röntgenograms had been taken previously of her head with a view to finding a cause for her infection.

Upon examining her mouth, I found that she had lost a good many of her teeth and yet among the few that remained there was one which, from external appearances, gave no evidence of hidden trouble. The gum tissue about both the palatal and labial aspect was in no sense inflamed or reddened. There was no tenderness upon pressure and there was no pain in the tooth itself upon percussion, nor did the patient recall ever experiencing any pain in the tooth except that which she had when the crown was placed upon it. This pain, however, only lasted for a day or so and the patient never had cause to suspect that she would have any further trouble from the tooth. I made a dental röntgenogram (Fig. 1) of that region of her mouth and located a small area of bone rarefaction about the apex of that tooth. The picture likewise disclosed the fact the crown had been very poorly set upon the tooth with the pin running in an oblique direction and that the canal had not been thoroughly filled, in fact scarcely showed any filling material whatsoever. In speaking to Dr. Chace who had referred this patient to me, and who will address you in the discussion of this paper, I stated what I had found and that, while I was doubtful as to whether we would find active organisms at the end of this tooth, I would certainly advocate its removal, at which time we would endeavor to grow a culture from it, curette the diseased bone and then treat the part as we would treat any infected bone wound.

In several days' time we learned from the laboratory that an organism had been found and that it was the streptococcus viridans. An autogenous vaccine was prepared and Dr. Chace instituted vaccine treatment of this patient, from which time on there was a pronounced improvement in her general health as well as her joints. About three months later she appeared at my office, walking in, her legs supported by braces. The most interesting features of this case are that her condition had been growing progressively worse in spite of all treatment up to the time that

the tooth was removed and vaccine treatment instituted, and from that time on there was the first evidence of improvement in her condition, though, of course, the patient, owing to the duration of the disease and the structural change that had taken place within the joints with the atrophy of the soft tissues, will never be a thoroughly well woman. Irreparable harm had been done before we saw the case; the other and more suggestive point in the case is that, upon inquiry, we learned that the tooth work was originally done about sixteen years ago, which corresponds to about one year prior to the onset of her first trouble. It may also be pertinent to the subject to refer to the fact that she had been röntgenographed about the head prior to seeing me and that, though other teeth were removed, the disease had not been detected about the real offender.

At this time I desire to call attention to the fact that, in a patient running a mild grade of fever for a long period of time, I have grown streptococci of the viridan type from about the end of a tooth which showed no bone rarefaction but was simply one of those cases where the pulp canal had not been completely filled and the germ had found a lodging place in the apical end of the canal. This stamps each pulpless tooth that is not filled to the end as a possible menace to the health of the host. Another startling bit of information is that I have found teeth that were thoroughly filled to the end and some which even protruded through the end as suggested by Dr. M. L. Rhein in which germs were grown from the periapical region.

A young girl about fifteen years of age was sent to the hospital with the following complication of diseases: chorea, or St. Vitus's dance, muscular rheumatism and a valvular lesion of the heart. She was observed in the medical ward and treated for some time without material improvement. When she was finally sent to my clinic the jactitation and convulsive movements of her body almost interfered with a thorough examination of her mouth. Yet staring us in the face was a gold crown upon an upper front tooth. An X-ray was made of this part and infection detected about the tooth. The removal of the tooth and curettement of the part was promptly followed by an improvement in the chorea and, at the expiration of several weeks, the patient walked before my class

with scarcely any evidence of the chorea. There was likewise such a pronounced improvement in the other conditions that she was considered well enough to be dismissed from the hospital.

Among the röntgenograms thrown upon the screen, there will be one (Fig. 2), taken of the mouth of a patient in private practice who is suffering from a most pronounced polyarthritis involving the joints of both hands. He was sent by his physician to determine what should be done so as to clear up the extensive pyorrhea involving all of the teeth in his mouth. Röntgenograms were made of all parts and advice was given him as to which of the teeth should be removed and which could be in all probability saved by treatment. The patient, after consulting a prominent pyorrhea specialist, returned to me with the information that he said he could save most every one of the teeth. This did not conform with my opinion in the matter. The patient, therefore, placed himself under my charge and I desire to show the teeth that this specialist would permit to remain in the mouth of a patient who had already shown distinct and alarming signs of systemic involvement. I cannot too strongly condemn the tendency of dental practitioners to conserve teeth that are so great a source of danger to the patient. This desire to save teeth is shared equally by the patient, who often exerts great influence upon the dental practitioner to allow the teeth to remain, which, in the dentist's better judgment, he knows should be removed. Patients generally have the impression that as long as the tooth gives them no pain, it is doing no harm.

In my opinion the most dangerous tooth is the one that gives no evidence of the infection that lurks beneath it. It lies like a snake in the grass ready to strike at the most opportune time. I could go on indefinitely citing grave cases of systemic disease that owe their origin or their seriousness to infections about the teeth and jaws. The opinions of such men as Hunter, Billings, the Mayos, Rosenow, Hartzell, Camac and others, whose views have been published in the medical and dental journals during recent years, should by this time have aroused the dental profession from its therapeutic lethargy to the extent that radical changes in practice should have been advocated and instituted.

Conditions instead of becoming better are becoming worse,

owing to the large number of students that come out of dental colleges each year prepared to carry on much the same type of dentistry as their predecessors. It is true that a small proportion of them are more progressively inclined and are equipping themselves with X-ray outfits, sterilizers, etc., so as to insure more perfect work, but the vast majority are still practising septic dentistry. To rectify the situation, it will be necessary to revolutionize the teachings in dental schools for, in a large measure, in spite of all that may be said to the contrary, too much time has been devoted in the dental curriculum to the purely mechanical side of dentistry, and the diagnostic and therapeutic training essential to the recognition and treatment of mouth diseases and their systemic concomitants has naturally suffered. At this point I wish again to refer, as I did in my address before the Stomatological Section of the American Medical Association at the time that I was Chairman of that Section, to the advantages of a complete medical education for dental practitioners, placing dentistry upon the same basis as other specialties in medicine. There is no part of the human economy that calls for more scientific study and care than the oral cavity. When the dental schools in this country are subsidiary departments of Universities and when the commercial phase of dental education no longer exists, then radical change may be possible and this country will follow in the footsteps of some of the European countries where the recognition, prevention and cure of mouth diseases by dental practitioners has not suffered from an overdose of mechanical training.

The state of Virginia has crowned itself with glory by being the first state in the Union to enact laws requiring the medical education of applicants to practise dentistry.² It will probably be a long time before such laws become universal. In the mean time those who are interested in the welfare of dentistry should heed the warning that I now sound that, unless radical and drastic steps are taken within the profession to discourage the type of crown and bridge work and other reparative work upon pulpless teeth that is a menace to public health, that the question of deal-

² Since writing this article the author learns that the laws regulating the practice of dentistry in Virginia have been rescinded or modified.

ing with this problem may be taken out of their hands through legislation prohibiting certain dangerous forms of dental practice. I am fully convinced that impure foods have not poisoned the systems of the people one-tenth part as much as oral sepsis has and yet the far greater evil of the two goes on unchecked by legislation and is promoted by dental education. It is almost criminal to allow students in the dental schools to do root canal work in the living subjects when one realizes how seldom this work is successfully done by practitioners who have been practising for years.

There was a practitioner of dentistry some years ago who had a reputation among his patients for never hurting them. He placed the most temporary sort of fillings in their teeth and he never bothered with teeth in which the pulps were involved but would immediately order their extraction. He seldom placed bridge work in the mouth and when teeth were lost replaced them by plates. He acquired a big and remunerative practice because his patients had to come to him frequently for the renewal of the temporary fillings and when they lost another tooth it meant a reconstructed plate. He conscientiously kept his patients comfortable and their mouths free from disease. I believe that that man, though he may have been selecting "the easiest way," had no conception of how sensible his method was and the thought occurs to me that possibly if more men were to conduct their practices in a similar manner, more people to-day would be free of the diseases produced by the more permanent type of dental work.

Crown and bridge work, as well as all work upon pulpless teeth, should be conducted by men who would specialize in that work and who would, through the medium of the X-ray, satisfy themselves that they were not putting a beautiful superstructure on a weak foundation. Röntgenograms should be taken from time to time after the insertion of such pieces to determine the state of health or disease of the hidden parts. Patients' mouths should be kept free from infection at all costs even though it should mean the removal of every tooth from the head. If it can be done without the sacrifice of the teeth, so much the better, but a toothless mouth is to be preferred to one containing a single focus

that menaces the health of the patient. In patients suffering from severe secondary or metastatic conditions the removal of teeth and the clearing up of infected areas should be done gradually so as not to cause too much toxic absorption at one time.

Whilst many diseases may be the result of mouth infection and most of them may be complicated by it, it is well to keep in mind that it is not responsible for all the maladies to which human kind are heir and, though it is well to arouse medical and dental practitioners as well as the lay public to a realization of the wide and varied effects of oral sepsis, we must work with a view to not letting the pendulum swing *too far* in either direction.

MANAGEMENT OF BADLY MUTILATED MOUTHS¹

BY HENRY W. GILLETT, D.M.D., NEW YORK CITY

Human nature is so constituted that it is only by preaching and aiming at the super-ideal that we reach the ideal. Likewise, it is only by preaching and aiming for the ideal that we reach practical and efficient service; and those whose aim is practical and efficient service, are apt to attain only mediocrity; while those who aim at mediocrity—or, as they would term it, average or ordinary results—usually make a most woeful exhibit when the sum total of professional effort in any line is reviewed. Therefore, it has always seemed to me wise to preach and to stimulate endeavor to attain the highest possible results, feeling sure that the personal equation of the human race, if I may be permitted so incongruous an expression, will do all the toning down that is desirable.

I desire to forestall here one point that is likely to be made in discussion—namely, that the full accomplishment of what I am about to advocate is possible only for a limited portion of our clientele, and of the practitioners of our profession. This I unhesitatingly acknowledge as a fact, but I hold it to be a futile argument against the wisdom of formulating and advocating the most efficient plans possible for the attainment of the desired end.

I also further reply in advance to this mythical critic that he has no means of knowing how our clientele will respond to a need once it has been made clear to them. I predict that when the dental profession, or its more active third, is able to say, with that assurance based on the certain knowledge of facts, which invariably carries conviction to the hearer—"your continued health, even your life, depends on the elimination of these ills and the establishment of better conditions"—then there will be the same acquiescence from them as in the case of the surgical operation necessary to continued life and health.

The fact that a patient will not submit to the treatment at the hands of the professional man, which his special knowledge

¹ Read at the Fifty-first Annual Meeting of the Massachusetts Dental Society, May 5, 6, 7, 1915, Boston, Mass.

dictates as the correct treatment, can, by no possibility, be twisted into a legitimate excuse for treatment that is incorrect. The plea that "a man must live" is not a legitimate reason for living at the expense, and to the detriment of those who place their health and lives in his care. I always feel sorry for the professional man who makes the statement "my patients won't stand for that" when advances are advocated. I feel that it reveals a deplorable weakness of professional character and standing.

We are holding the rudder for our patients between life and death, health and invalidism, efficiency and failure in daily life, and in the essentials compromise is reprehensible, and on the points where it is permissible, only the best attainable in the given set of conditions can sanction a clear conscience.

In my estimation, the two general problems in our work calling for the broadest knowledge, the greatest skill and the most determination and courage in handling them are—first, the *prevention* of diseased conditions, which is the problem of the orthodontist and prophylaxist, and, second, the management of badly mutilated mouths. I am unable to distinguish between the present importance of these two problems, but I am inclined to feel that the one we are to consider at this hour is the more critical one in the present stage of our development. My reason for this feeling is that it is the one by which we are just now more likely to be judged by the critical members of the medical profession, and by those of our clientele who are qualified to formulate opinions on the subject. Prevention is undoubtedly the broader problem, and it will be by our success in this field that we shall be judged by future generations.

In support of this opinion (as to the status of the second problem), I would call to your attention that the badly mutilated mouth commonly presents the advanced stages of nearly every ill which we are called upon to treat, that there will always be mal-occlusion and defective occlusion, either or both of which will involve an inefficient performance of the initial step of digestion, and that following this inefficiency comes a train of ills influencing the whole system, while almost invariably such a mouth as we are considering presents many foci of infection in the form of chronic fistulae, blind abscesses and chronic pyorrhea pockets.

Here we have given into our charge probable primary sources of disease of the gravest nature, problems which call for our most careful forethought, and our utmost ability in their solving, which should not be approached without full realization that we are dealing with the life and health of the patient.

I speak of this as the critical side of our work, because it is one upon which the thought of the public is at the present time very much centered. It is coming to be common knowledge amongst our medical friends, and our clients, that many and serious diseases have been traced back to foci in the mouth, and that the elimination of inefficiency and disease in the masticating organ has frequently been followed by the disappearance of serious diseases in other parts of the system. This means that the frequently advocated policies of "letting well enough alone," "letting sleeping dogs lie," and habits of slipshodness and inefficiency in dental work are becoming hazardous.

The time honored statement that "dead men tell no tales" still holds good, but "dead" teeth, plus a good röntgenogram, tell many a tale, and increasing knowledge is rendering these tales more and more embarrassing.

Thus far there seems to be a general disposition on the part of the medical profession to be lenient in its judgment, and to realize the difficulties of our position, to realize that much of our present knowledge is new knowledge, and that we may not justly be held responsible for many of the things which necessarily have been done blindly in the past. As regards the future, however, the situation is different, and it requires no argument before the members of this audience to make clear the fact that the dental profession must "set its house in order," and formulate effective plans by which not only may disease be eliminated from, but efficiency restored to, the badly mutilated mouth. I do not mean to imply that this has not been done in the past, but I do say that it has been done heretofore by a small percentage of our members. That there is now need for radical revision of standards in many of our procedures to save our profession from discredit, seems to me obvious.

I am quite aware of the fact that many of you have come here to-day hoping to have presented some plan in detail which

shall prove a panacea for the handling of mutilated mouths. It is, however, my intention to give but little attention to detailed plans of work. One reason for this is my belief that such is not the need of the moment. We have had, in the past, plenty of ingenious devices presented for service in such cases, and many successful case histories have been spread upon our records. Nearly all of these devices are useful in the cases to which they are adapted, but in my estimation what we need most of all for the successful handling of these cases is the establishment of an *ideal* toward which we are to bend our efforts. I believe the time has come for official expression concerning practices that jeopardize the health of the public, and for concerted effort in supplying the knowledge necessary for self protection.

It is my belief that many of our failures to accomplish the best results in the past have been due to our concentration upon detail, and our neglect to study the broad problem presented by each case. I believe that we need a more general realization of the fact that successful restoration of badly mutilated masticating organs to health and efficiency can be expected only when there has been careful diagnosis in advance of any work, and a carefully laid plan in which the relation of each element of the work to the final result has been carefully studied. It is self-evident that no plan can be made for the successful restoration of efficiency in a badly mutilated masticating organ, until all areas of disease affecting the attachments of the teeth remaining have been eliminated, either by cure, or by surgical removal. Therefore the duty is laid upon every practitioner, who undertakes the restoration of such an organ, of locating every diseased area, as one of the first elements of his diagnosis.

In the light of our present day knowledge, no operator is excusable in assenting to the retention of pathological areas in the mouth of any patient in his care. If a pus producing area in the mouth cannot be eliminated, or reduced to such a condition as to cease to be a menace to the patient's general health, then no practitioner is warranted in retaining in the mouth the tooth, or teeth, so involved. To use teeth so involved as supports for important superstructures, either in disregard of sound surgical

principles, or because of inefficient diagnosis, should be considered most reprehensible.

Having arrived at the point of being able to determine how much sound tissue, and how many sound elements of the masticating organ are to remain, then the operator is in a position to lay his plans for the restoration of masticating efficiency. I feel that it should be self-evident to every practitioner, who has the requisite skill for such a piece of work, that one of his first needs in formulating his plans is a set of carefully and accurately made models of the actual conditions. In my estimation it is no more feasible for the prosthodontist successfully to handle such cases without careful study of accurate models, than it is for the orthodontist to formulate his plans concerning an orthodontia case without them. Models of primary and finished conditions are of equal value in both instances, and it is of equal importance that the models should be carefully and accurately made. Accurate diagnosis is nearly always dependent upon these accurate models, and no operator is warranted in undertaking the restoration of a wrecked masticating organ without accurate diagnosis, and a complete general plan of the work before he undertakes the mechanical performance of its elements.

It makes no difference if it be a case which must be handled as a whole, at one series of appointments, or whether its conditions be such that it may be spread over a long period before it is completed. If the hope is held out that the work is to be done in such a manner as to conserve the patient's best interest, then every element of it must harmonize with every other element, and with the whole, or else grave injustice will be done to the patient.

Reliable röntgenograms are even more essential because without them the operator can gain but little knowledge of the true condition of any areas about the roots of the teeth that may be in a pathological state.

In the light of our present knowledge, and in view of the ease with which certain evidence of the presence, or absence, of blind abscesses, granulomata and incompletely filled root canals may be obtained in nearly every case, by the proper use of the X-ray, and in view of the very serious risk of leaving such condi-

tions, no operator is warranted in claiming to render efficient service unless he has proof by röntgenogram of the soundness of attachment and correct root filling of the involved teeth before he uses them as supports for any kind of substitutes for lost tissue.

Your essayist habitually insists upon a preliminary röntgenogram of every tooth in which pulp canal work is to be done, and considers no pulp canal filling complete until the X-ray picture demonstrates that it meets effectually the requirements of the case.

It should be superfluous to mention to this audience the need for rigid asepsis at every step of every root canal case. Unfortunately the evidence of neglect in this line is only too common, and as long as we have men who change root canal dressings without using the rubber dam, and insert in root canals cotton dressings that have been wound on broaches with septic fingers, we shall have to keep hammering at these, and the many other details necessary to maintenance of asepsis in this work.

This operation calls for asepsis equal to that for a laparotomy, and I commend to your individual consideration the test question of whether you would be willing to have your own appendix removed with the same attention to asepsis that you give to your root canal work. If you would not, then it is your task to reform your technique before you touch another root canal.

Unless pathological areas have been surely eliminated, and strict asepsis observed in every step of the concomitant pulp canal work as a preliminary to the upbuilding of a mutilated masticating organ, the case is worse than a failure, and a fraud has been perpetrated on the patient.

The standard in planning for the rebuilding of a masticating organ should be harmony of the whole restored organ so that it will work as a unit. This involves provision for normal movement, normal occlusion, and normal shape of cusps and sulci.

Efficiency is dependent on these, and there can be no excuse in principle for leaving elongated teeth and locked conditions of the bite.

With but few exceptions the fixed bridge is not a sanitary appliance. The cases are very rare in which they are kept clean

enough to satisfy the reasonable requirements for a healthy mouth.

For you who think differently, I offer this test. Study first the May issue of "Items of Interest," and grasp well the views of those whom you will recognize as authorities on the subject on which they write. Then take your bridge work cases as they come in, and study them carefully and honestly. See what proportion have about them sordes and filth that you know must have lain undisturbed for weeks if not months, question the patients as to what efforts they really make, and how persevering they are in their efforts to remove such deposits. Test the odor of the deposits from the less accessible areas, and send cultures from them to your bacteriologist; study the progressive congestion in the adjacent gingival tissues.²

I challenge every last one of you to make such an investigation earnestly and faithfully, and then come back and tell us that one per cent of the fixed bridges are fit to stay in the mouths of their wearers.

Fixed bridges are properly limited to one, or at most to two teeth, for patients of clean mouth habit, the bridges so constructed that the patient can, and for the one who will, constantly and steadily maintain strict cleanliness—that one in a thousand patients willing to spend 20 to 30 minutes every day over the mouth toilet.

To what degree the exigencies of a case calling for splints may justify modification of this ruling must be decided for the individual case, but there is reason for grave suspicion that in a large proportion of such cases more harm than good is done the patient by the retention of such teeth.

The atrophy of pericemental attachments that so frequently follows the fixation to each other of sound teeth as a result of the loss of their normal individual movement is leading me to be conservative about such fixation even of individual roots that are to be used as supports for removable pieces. Probably this article will not be published before we shall have presented in some of our journals an article by Dr. H. E. S. Chayes, in which

² See also the chapters on gingivitis in Dr. G. V. Black's "Special Dental Pathology."

he will elaborate a new bridge work principle calling for a rocking mobility in all bridge pieces so that not only pericemental tissues, but all adjacent and underlying gingivae, shall be safeguarded from stasis by the intermittent pressure made possible by such construction.

His underlying principle I believe to be undeniably sound. If found practicable, its application will mean a revolution in our bridge work procedures. I have seen enough of his clinical results to feel sure that his arguments will challenge our earnest consideration.

Now, for a concise consideration of ways and means for up-building a wrecked masticating organ. Our standard should include a restoration of all occlusal surfaces to the highest feasible plane of efficiency, a normal relation of these surfaces to those occluding with them, and a relation of the occluding planes that will permit of normal function of the whole organ.

To accomplish this we will often need the help of the orthodontist, and still more frequently will we need to be radical in our removal of portions of elongated and malposed teeth. The sound healthy tooth is even more precious to-day than in the past, but the diseased or malposed tooth that materially reduces, or prevents efficiency of the masticating organ is seriously detrimental to its owner.

Interest in the patient's welfare dictates that such interference shall be removed because efficiency in mouth digestion is fundamental to efficient nutrition, and efficient nutrition is fundamental to all effectiveness of the individual. This means shortening, or cutting off, elongated and hopelessly malposed teeth, and radical treatment of mal-relations, if you are holding out hope of restoration to real efficiency.

Having cleared the field by careful diagnosis, certain elimination of pathological elements, and so far as feasible, of inharmonious elements, we are ready for the up-building. I now constantly advise removable appliances, and invariably do I categorically refuse, except within the narrow limits already defined, to use fixed appliances. I rest on the plain statement that there is no legitimate excuse, or reason, for inserting in our patients' mouths any appliance that they cannot thoroughly clean. The

fact that so many are afflicted with ingrowing laziness that they will not clean a removable appliance is of no value as an argument.

The plain old partial plate is better and safer than a fixed bridge, and up-to-date methods can make it very effective. The saddle and lug principle of the late W. G. A. Bonwill is still of great value, the various small attachments, of which the Roach is a favorite form, are effective helpers, as are the numerous variations of the split bar principle; the Gilmore clasp has high efficiency when used for suitable cases (notably those in which there is no marked pyorrheal diathesis.) Dr. C. F. Ash's split bar attachment is invaluable, and those of Chayes and Weinstein, not yet on the market, will extend our ability to render valuable services.

I have tried to indicate to you my belief that the two chief needs of the branch of our work we are considering are better standards (better ideals, if you choose), and better diagnosis. I hold it to be an imperative duty imposed by the results of our research work, and the knowledge that medical men have spread before us, to remodel our standards, and so to state them that he who practises, not only may read, but must read. This imperative duty includes insistence that pathological areas must not go undiscovered and unremedied at our hands with our assent, likewise insistence that remedial measures must not be such as to menace the patient's welfare, as does most of the fixed bridge work of to-day. The dentist of the future who fails in these things must lose caste.

In the mechanical steps there must be compromise in many cases until we advance to that surely coming era in which the dietitian, the orthodontist and the prophylaxist shall eliminate the need for their consideration.

THE DENTIST IN THE GREAT WAR¹

BY WILLIAM H. POTTER, A.B., D.M.D.

Professor of Operative Dentistry, Harvard University.

My first contact with the war was in London from the 1st to the 21st of August, 1914. I saw preparations for the volunteer army. And, as I stood by the recruiting stations, I was very much impressed by the deplorable condition of the teeth of the men who offered themselves for military service. It was not necessary to put them in a dental chair, or have instruments to examine their mouths, you could tell by the exhibition of their teeth as they spoke one to another. It was evident that as soon as they got into active service they would be incapacitated by toothache, and this incapacity would be a very serious matter as regards efficiency.

I offered my services to the British Dental Association, and said that I should be glad to devote all my time to improve the condition of the mouths of the volunteers. But the dental work was not in hand at that very early day and my offer was declined, and I was unable to take part in military dentistry in England. In November, 1914, I was invited to join the Dental Surgery Staff of the ambulance of the American Hospital in Paris, and I promptly presented myself for service. This hospital was established in September, the second month of the war. A newly erected high school building in Neuilly, a suburb of Paris, was obtained from the government and fitted out for a hospital by a body of Americans living in Paris.

It is an American hospital in that it is financed and managed by Americans and most of the surgical and nursing staff are Americans. It was a fortunate circumstance that the chief surgeon of the hospital, Dr. du Bouchet, came of a family of dentists. His father and brother were of that profession and he, therefore, knew much of the need of dentists in a military hospital. It was natural then that when Dr. George B. Hayes, a practising dentist of Paris, offered to establish in the hospital a dental surgery department, that the proposition was favorably received.

¹ Read before The American Academy of Dental Science, Boston, October, 1915.



Fig. 1—Clinic of the Department of Dental Surgery at Ambulance of the American Hospital, Paris

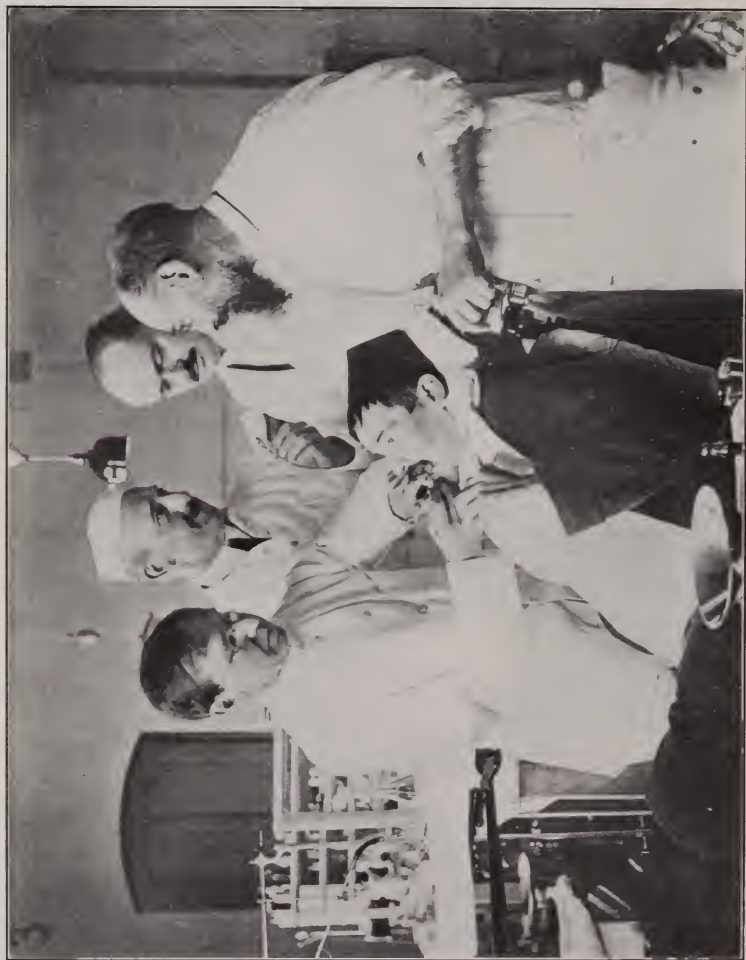


Fig. 2—A Consultation: Drs. Hayes, Davenport, Choquet, Potter

Dr. Hayes soon called in as an associate Dr. Wm. S. Davenport, and later Prof. Choquet and Dr. Hotz, and still later the writer. A fundamental object of the department was the establishment of a condition of cleanliness, comfort and efficiency in the mouths of all patients in the hospital. To this end each patient was to be examined as soon as he arrived, and work upon the mouth begun as soon as the patient's condition would allow.

It was the earnest endeavor of all connected with the department, as far as possible, to establish a condition of oral hygiene in all patients. As a result we cleaned teeth, removed tartar, extracted roots and badly broken down teeth, filled the cavities of teeth worth saving and even filled many root canals, just as would be done in private practice. The operations which would be called "ordinary dentistry" were held of the highest importance in ensuring comfortable, efficient mouths and in removing sources of infection to nearby wounds. It cannot be claimed that the mouth of every patient was treated in this way. For many reasons it was impossible to accomplish the ideal in every case. But a most determined effort was constantly made to reach every man, no matter where his injury was, and give him the benefit of a dentist's skill.

Considering the fact that in very few hospitals maintained under conditions of peace is there a systematic care of their patients' teeth, great credit is due to the head of the dental department of the American Ambulance in establishing the work upon such a scientific basis when the great disasters of war were pressing for treatment.

A few words should be said as to the equipment. We had a large operating room with four operating chairs and adjoining cabinets. We had instruments suitable for the work in hand. Adjoining the operating room was a wash and sterilizing room. There were two trained nurses and two or three assistant nurses always on duty. At first Drs. Hayes and Davenport took to their private offices all mechanical work and it was finished by their workmen. Later a commodious laboratory was added to the hospital operating room and three mechanical men were kept constantly at work. Much use was made of photography during the entire progress of a case. Prof. Choquet was an expert in

color photography and made many valuable records of this kind. Besides his work the regular hospital photographer was at the disposal of the department. Plaster casts were of course made of fracture cases and records made of all steps in the treatment. The most interesting part of the work at the Ambulance was the treatment of fractured jaws and the face wounds attendant upon them.

Every soldier brought to the hospital with a wound of the face was examined by one of the dental surgeons to determine whether the bones of either maxilla were affected. If the injury involved either one, the case was under the daily care of our department until recovery. Almost all fracture cases required the joint care of the dentist and the general surgeon. The dentist treated the fractured bones and the surrounding parts until the bones were re-united and the tissues healed about them. The general surgeon then did a plastic operation to close up the external wound and restore the soft tissues where necessary. There was the most cordial co-operation between the dental and the general surgeons.

A definite idea of the dental clinic at the American Ambulance and of the cases can be obtained from the pictures appended. No. 1 is a general view of the clinic taken last January. Drs. Hayes, Davenport and Choquet represent the operating force. Our head nurse, Miss Daly, is on the extreme left and then there are the French and English soldiers who are being treated for fractured jaws. The clinic in May, when I last saw it, showed a much larger group of patients, nurses and operators.

No. 2 represents a consultation over a French soldier. This was a case upon which I worked for about three months with some satisfaction mixed with many disappointments. Consultations of the kind here represented were of very frequent occurrence, and offered an opportunity for the exchange of professional knowledge.

Cuts 3, 4, 5 show a soldier from the French African colonies. He was shot by a rifle bullet through the open mouth. All the teeth on the left upper and under jaws were carried away; the bullet struck the lingual side of the lower jaw near the angle, producing a fracture with much loss of substance and the large



Fig. 3



Fig. 4



Fig. 5

Figs. 3, 4, 5—A soldier from the French African Colonies shot through open mouth with extensive fracture of left lower jaw

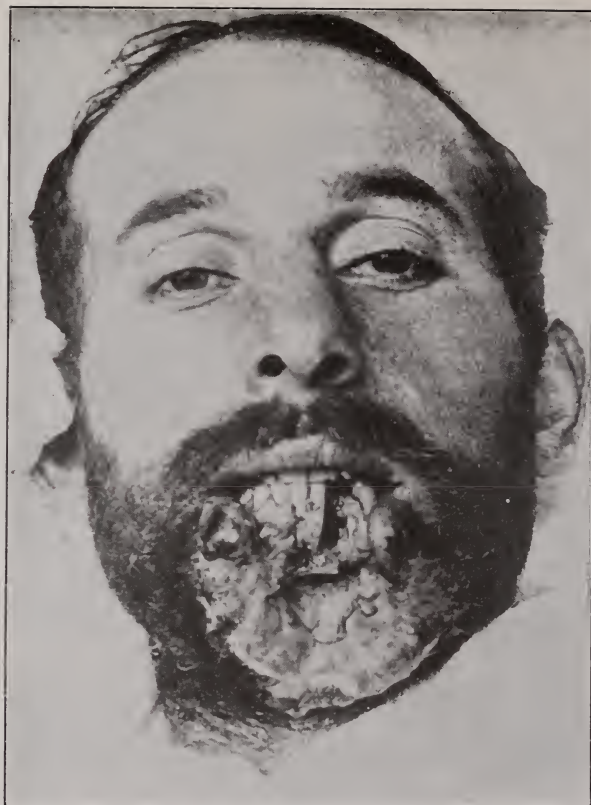


Fig. 6

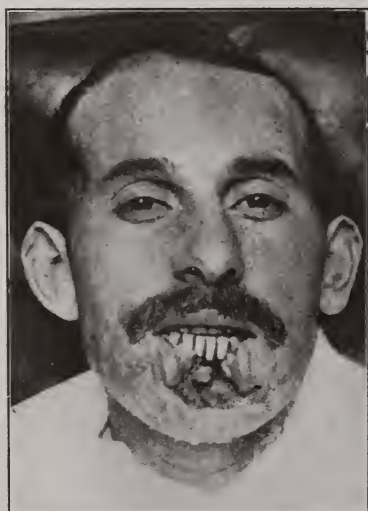


Fig. 7

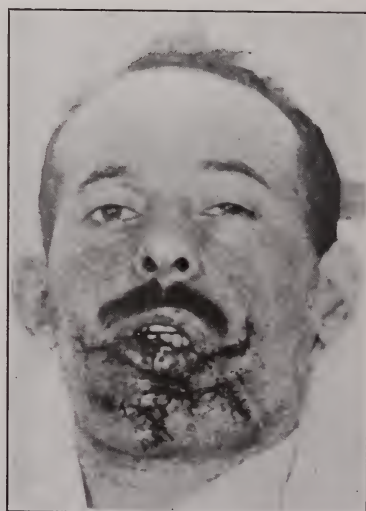


Fig. 8

Figs. 6, 7, 8—A French soldier injured by a bullet striking left lower incisor region and fracturing the jaw with large loss of bone and extensive destruction of soft tissues of the chin

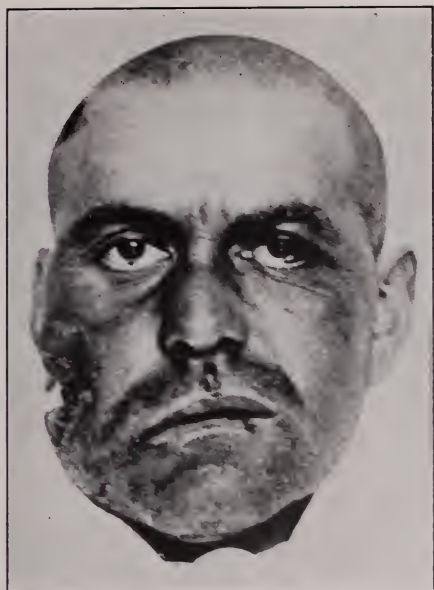


Fig. 9

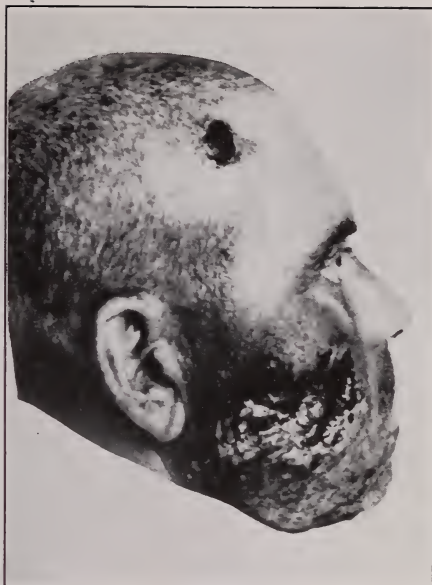


Fig. 10



Fig. 11

Figs. 9, 10, 11—A French soldier struck by a large fragment of shell casing which fractured the upper and lower jaws



Fig. 12



Fig. 13



Fig. 14

Figs. 12, 13, 14—A French soldier whose lower jaw and surrounding soft tissues were carried away by a piece of shell casing

external wound as shown in the cut. There was such a large hole through the cheek that you could look through it as if it were a window. This case shows the destructive power of a rifle bullet when it strikes a hard substance like bone. The velocity is so great that pieces of teeth and of the jawbone are driven into the soft tissues and become in themselves projectiles. An interdental splint for the right side was fitted to this man and worn for many weeks. This splint kept the jaw from swinging to the left towards the injury and upsetting the normal occlusion of the teeth which remained. Cuts 6, 7, 8 represent a man shot by a rifle bullet which first struck the crowns of the lower incisors, then went through the lower jaw at the symphysis, at the same time carrying away the soft tissue about the chin. This man was shot at a distance of thirty meters and his wounds show what a high velocity bullet can do. The two halves of this patient's jaw were freely movable and there was much ragged bone and some loose teeth in the wound. The fracture was treated by the making of a metallic bridge splint with bands surrounding the bicuspid and cuspid on each side, and with porcelain teeth to take the place of those lost by the wound. This splint restored normal occlusion and kept the parts at rest. A plastic operation on the soft parts closed up the gap about the chin, and made the man presentable in public.

Figures 9, 10, 11 show a man who was struck by an irregular piece of shell casing about $3\frac{1}{2}$ inches long by two inches wide. This piece of iron had nearly spent its force but it had power enough to make a double fracture of the upper and under jaws. A rubber plate was made to push the displaced fragments of the upper jaw into place, and then the lower teeth were forced into occlusion with the upper and held in place by a chin bandage. In this way the upper teeth formed a splint for the lower jaw and by this treatment the fractures were healed.

Figures 12, 13, 14. This is one of the most distressing cases which I have seen. He was hit apparently by a piece of shell casing, which took away nearly all the lower jaw with the adjacent soft parts. A small part of the ramus of the jaw on each side was left intact as was also the tongue. In spite of his extensive wounds his temperature became normal after ten

days in the hospital. This man was under the care of the department of dental surgery for at least four months, and then was ready for an artificial lower jaw, over which a restoration of soft tissue could be made.

Number 15 shows a typical wound by a rifle bullet striking the lower incisor region, fracturing the jaw at the symphysis, and making extensive wounds to the soft parts about the chin. Wounds of this kind can occur without the bullet entering the body, and the matter is explained by the position of the soldier in the trench leaning forward and projecting the chin in the sighting of a rifle.

Mention should be made of two cases where an insert of bone was made to take the place of bone lost in the fracture. In one case the bone was taken from a rib and in another from the tibia. The insert was made over the body of the lower jaw as deep in the tissues as possible without entering the oral cavity. One case died of pneumonia though the bone insert was doing well. The other case was very favorable in all respects.



Fig. 15—A French soldier shot in the lower incisor region with compound, comminuted fracture of lower jaw and great laceration of soft tissues of the chin

CHEMICAL STUDIES OF THE RELATIONS OF ORAL MICROORGANISMS TO DENTAL CARIES.¹BY WILLIAM J. GIES AND COLLABORATORS.²4. A Biochemical Study and Differentiation of Oral Bacteria, with Special Reference to Dental Caries
(continued). (III)³

BY I. J. KLIGLER.

(From the Biochemical Laboratory of Columbia University, at
the College of Physicians and Surgeons, New York.)

II. EXPERIMENTAL (continued).

(Second section.)

7. Biochemical data. In accord with the general plan outlined in the first paper of this series, and as initial steps toward the solution of the problems there suggested, experiments were made to ascertain (a) the degrees of fermentation of certain carbohydrates by oral bacteria; (b) the effect of the important salivary constituent—mucinate—on the growth of oral bacteria; (c) the action of oral bacteria on salivary mucinate; and (d) the

¹ Reports of findings in investigations conducted under the auspices of the First District Dental Society of the State of New York.

² This is the fourth section of the senior author's report for 1914-'15. See the *Journal of the Allied Dental Societies*, 1915, x, pp. 137, 141, 282. The fifth and sixth sections follow: *Ibid.*, pp. 459, 464. The next issue of the *Journal of the Allied Dental Societies* will present the delayed conclusion of the report for 1913-'14, to which reference was made in the second footnotes in the first and third papers in this particular series.

³ Accepted by the executive officer of the Department of Biological Chemistry of Columbia University, as *Part III* (conclusion) of a dissertation, submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy, in the Faculty of Pure Science, Columbia University, June, 1915.

The strictly bacteriological part of the work was conducted in the laboratory of the Department of Public Health, American Museum of Natural History, under the supervision of the executive officer of the Biochemical Department of Columbia University. At Dr. Gies's request we were privileged to obtain, at the Clinic of the New York College of Dental and Oral Surgery, numerous specimens of dental deposits. We are indebted to Drs. Louise C. Ball and Frank L. Chambers for courteous and very helpful coöperation in this connection.

solvent action of certain oral microorganisms singly, and in combination, on powdered tooth in a glucose-containing medium.

FERMENTATION OF CARBOHYDRATES. The readiness with which glucose, lactose, and sucrose are fermented by oral bacteria is shown by the data in Table XXI, which relate to fermentation in standard sugar-free "meat-infusion" media,* containing the individual sugars (1 per cent) to be tested.

TABLE XXI.—DATA PERTAINING TO THE FERMENTATION OF SUGARS BY ORAL BACTERIA.

| Sugars fermented | Glucose | Lactose | Sucrose | Glucose only | Glucose; also lactose | Glucose; also sucrose | Glucose, lactose, and sucrose individually |
|--|---------|---------|---------|--------------|-----------------------|-----------------------|--|
| No. of bacterial strains tested.. | 426 | 386 | 326 | 426 | 386 | 326 | 322 |
| Percentage of the strains that induced fermentation..... | 99.5 | 70 | 72 | 15 | 23 | 16 | 56 |

* The standard media were made according to directions in a report to the American Public Health Association in 1912: *Standard Methods for the Examination of Water and Sewage*, p. 77; 1912. See text-books in bacteriology.

From the figures in Table XXI it is evident that glucose was fermented by practically all the strains represented in the available dental deposits. Lactose and sucrose were individually attacked less regularly though by large majorities of the strains. The data also show that the three sugars were attacked individually by just about half the number of strains, while the remaining strains fermented either glucose only or two of the three sugars individually.

Attempts were made to determine the relative fermentability of certain sugars in equivalent volumes, by typical oral bacteria, as measured by the resultant amounts of acid. The test media were prepared and the cultures inoculated by the junior author; the titrations for acidity were made in this laboratory by Misses Lottie M. Hull and Jeannette C. Mullikin under the senior au-

thor's supervision, and with the coöperation of Dr. Benjamin Horowitz.

The test media were made from "meat infusions" according to the standard methods⁴ and included the addition of one per cent of the sugar to be tested. The tubes were sterilized for 30 minutes, in an Arnold steam sterilizer, on three successive days. The titrations were made with $n/20$ sodium hydroxid solution, phenolphthalein serving as the indicator.

The results are expressed, in Table XXII, in terms of the number of cubic centimeters of normal hydroxid solution necessary to neutralize 100 cc. of the culture medium, each value representing average acidity produced by the different representatives of a given species, under approximately equal conditions of incubation for each form.

TABLE XXII.—DATA PERTAINING TO THE AMOUNTS OF ACID PRODUCED BY ORAL BACTERIA IN MEDIA CONTAINING DIFFERENT SUGARS.

| Type of Organism | Sugar | | | |
|-----------------------------|---------|---------|---------|---------|
| | Glucose | Sucrose | Maltose | Lactose |
| <i>D. flavus</i> | 2.5 | 2.6 | 2.7 | 0.6 |
| <i>Staphylococcus</i> | 4.5 | 2.5 | 3.1 | 4.5 |
| <i>Streptococcus</i> | 4.2 | 4.2 | ... | 4.0 |
| <i>B. acidophilus</i> | 5.6 | 0.9 | 5.4 | 5.8 |
| <i>C. placoides</i> | 3.2 | 4.3 | 3.7 | 0.5 |
| <i>L. buccalis</i> | 3.9 | 0.5* | 2.7 | 0.4 |
| <i>Actinomyces</i> | 1.9 | 0.2 | 0.4 | 0.6 |

* This result is doubtful, the titration result for only one of the strains of this type having been recorded. Other representatives of this species actively fermented sucrose.

Another series of titrations were conducted, by the junior author, on lactose-broth media, to determine the relative amounts of acid produced by a number of recently isolated strains of staphylococci, streptococci and *B. acidophilus*. These types were selected because they represent the most active acid-producers. The average results were (in accord with the notation in Table

⁴The "standard methods" referred to here and elsewhere in this paper were described in a report to the American Public Health Association, in 1912: *Standard Methods for the Examination of Water and Sewage*, p. 77; 1912.

XXII): *Staphylococcus*, 4.8; *streptococcus*, 4.8; and *B. acidophilus*, 7.0.

From the data in Table XXII it is evident that glucose and maltose were more readily fermented, in general, than sucrose and lactose; also, that the amounts of acid produced, from the sugars used, were fairly constant in most cases for each type of bacteria. From the data in Table XXII, and those for the tests in lactose-broth media, it is apparent that *B. acidophilus* is capable of elaborating and withstanding a greater amount of acid than that produced and resisted by any of the other types.

THE EFFECT OF MUCINATE ON THE GROWTH OF ORAL BACTERIA. Pure sodium (salivary) mucinate, from supplies prepared for some of the senior author's studies in other relations, was added to standard media in a concentration of 2:1000 (0.2 per cent). Comparisons were made between growth in plain standard broth and that in broth containing mucinate; also between growth on mucin-agar and that on glucose-agar.

Over 60 strains, representing different oral types, were tested. Of these, 20 grew better on glucose-agar, 20 grew better on mucinate-agar, while 22 grew equally well on both media. Glucose was distinctly favorable for the growth of the *B. acidophilus*, while mucinate was decidedly stimulating to the growth of the thread-forms.

In the *broth*, 47 cultures grew equally well; 3 grew better in plain broth, while 15 grew better in the medium that contained mucinate.

Salivary mucinate evidently favors the development of specific oral bacteria (*C. placoides*, *L. buccalis*), but is without influence on a number that are not specifically oral types.⁵

We endeavored to ascertain the influence of salivary mucinate on the acid-producing power of oral microörganisms in glucose-containing media. Standard glucose-broth was prepared, divided into two portions and sodium mucinate added to one (0.2 per cent); the two media were then tubed and sterilized

⁵In the preparation of the culture media, the mucinate was subjected to temperatures intended to effect sterilization. It is possible, of course, that the influence of mucinate was increased or decreased by the heating process. We have no information on this point, however. The well-known resistance of glycoproteins in this relation suggests that the sterilization process was devoid of the suspected effects.

under uniform conditions. Ten cultures, chosen at random, were inoculated into each of the two media, the tubes incubated at 37 degrees C. for five days, and the ensuing acidity determined with $n/20$ sodium hydroxid solution, phenolphthalein serving as the indicator. The results, shown in Table XXIII, indicate that the amounts of acid produced by the various organisms were approximately equal in both media.

TABLE XXIII.—DATA PERTAINING TO THE INFLUENCE OF SALIVARY MUCINATE ON THE ACID-PRODUCING POWERS OF ORAL MICROORGANISMS.

| Number of culture | Mucin-glucose broth* | Glucose broth* |
|-------------------|----------------------|----------------|
| 31a | 3.2 | 3.3 |
| 48a | 2.8 | 2.8 |
| 54 | 2.4 | 2.3 |
| 84 | 4.2 | 4.4 |
| 103 | 3.5 | 2.6 |
| 124 | 3.0 | 3.0 |
| 129a | 3.5 | 4.5 |
| 180a | 3.9 | 2.8 |
| 183 | 2.6 | 3.0 |
| 189 | 3.2 | 3.2 |

* The numbers represent acidity in terms of cubic centimeters of normal alkali solution required to neutralize 100 cc. of the culture.

THE ACTION OF ORAL BACTERIA ON SALIVARY MUCINATE. The influence of bacteria on the mucinate *in saliva* was not determined satisfactorily, in the few experiments we have tried thus far in this connection. Efforts to sterilize saliva, without removing or modifying the contained mucinate, were unsuccessful. Thus, passage of saliva through Berkefeld filters did not wholly prevent the appearance of bacteria in the filtrate, although it resulted in removal of most of the mucinate. The filtration was very slow and it is possible there was time enough for bacteria to "grow through" the filter into the filtrate. Further attention will be given to this matter in a succeeding report on this and related subjects.

The following method was finally adopted as the most desirable at this stage of our progress: Saliva was filtered through

a Berkefeld filter into a sterile weighed flask. The flask and saliva were then weighed, and powdered sodium mucinate added (0.5 per cent). By means of a sterile pipette, 10 per cent sodium carbonate solution was added, drop by drop, until the last portion of the mucinate, after thorough mixture, went into solution. This generally gave a medium that was neutral or slightly alkaline to phenolphthalein. (The sodium mucinate was slightly acid to phenolphthalein). The solution was then shaken with toluene, tubed with aseptic precautions into sterile tubes, and the latter heated on a water-bath for 30 minutes, on three successive days, at 60 degrees C. The tubes were then incubated and those that showed growth discarded. This treatment left the mucinate practically unaltered chemically (as shown by precipitation and reduction tests), drove out the toluene, and gave a fair number of sterile tubes.

Pure cultures of a number of oral microorganisms were inoculated into this sterile, artificial, saliva. The results were negative, that is to say, there was no increase in acidity and the amount of mucinate was undiminished, as determined approximately by comparisons of the masses of precipitates obtained after uniform acidification. These observations will be extended and the results described in the next annual report.

THE RELATIVE SOLVENT ACTION OF DIFFERENT TYPES OF ORAL BACTERIA, SINGLY AND IN COMBINATION, ON POWDERED TEETH IN A MEDIUM CONTAINING CARBOHYDRATE. The following method was employed in the tests in this connection: One-tenth gram portions of powdered human tooth were carefully weighed into clean, dry, Erlenmeyer flasks.⁶ One hundred cc. of standard 1 per cent glucose-broth were then added to each flask and all were sterilized for 30 minutes, in an Arnold steam sterilizer, on three successive days. A small, platinum, loop-full of the tested culture was then inoculated into one of the flasks. Where a mixture of organisms was used, a loop-full of each culture was added to the contents of the flask. Into one flask (b)

⁶ The powder was prepared from miscellaneous enamel and dentin fragments from normal teeth. The material was taken from a supply that had been used in the work discussed in the concluding section of the senior author's report for 1913-14. (See footnote 2, p. 445.)

5 cc., into another (c) 7.5 cc., of normal lactic acid solution were placed, while one flask (a) was left free from lactic acid to serve as a non-acid control. The flasks were then incubated at body temperature for 15 days.

At the end of the incubation period, 5 cc. portions of the culture fluid from each flask were withdrawn to evaporation dishes, 45 cc. of distilled water added to each, and the acid contents determined with *n*/20 sodium hydroxid solution, phenolphthalein serving as the indicator.

The cultures were next passed through fine filter-paper until perfectly clear filtrates were obtained. Two 40 cc. portions from each filtrate were then carefully pipetted into each of two small porcelain crucibles and the fluid evaporated to dryness on a water-bath. The residue was dried in a hot-air oven over night, and incinerated to constant weight in a "multiple unit" electric muffle. The degrees of solvent action of the organisms on the powdered tooth were ascertained by determinations of the amounts of calcium, in the resultant masses of ash, by the McCrudden method.⁷

The results for the types, or combination of types, of bacteria tested, in terms of the amounts of acid produced, and of the number of milligrams of calcium dissolved in 100 cc. of the filtered media, are summarized in Table XXIV. It is noticeable that there was lack of parallelism between the figures for total acidity and for the quantities of calcium dissolved, although in a general way a large yield of acid was associated with marked solution of calcium. Thus, No. 143 (*B. acidophilus*) brought about a solution of approximately the same amount of calcium whether grown separately or in combination with *B. putrificus*, even though the total acidity was different in the two instances. The same was true in the case of No. 54. In all the combinations in which it was tried practically the same amount of calcium went into solution, although the total acidity varied from 5.4 to 7.6.

The observed disparities were probably due to differences in the character, proportions and conditions of the acidic fermentation products; possibly, also, to undetected errors of analysis.⁸

⁷ McCrudden: *Journal of Biological Chemistry*, 1911, x. p. 187.

⁸ See the succeeding section of this report for further allusions to this matter: *Journal of the Allied Dental Societies*, 1915, x, p. 459.

TABLE XXIV.—DATA PERTAINING TO THE SOLVENT ACTION OF CERTAIN
TYPES OF ORAL BACTERIA ON POWDERED NORMAL HUMAN TOOTH
IN GLUCOSE-BROTH.

| Organism | No. of culture | Acidity expressed as cc. of normal acid per 100 cc. of the culture | Amount of calcium in 20 cc. of the culture mg. | Average amount of calcium in 100 cc. of the culture mg. |
|--|-----------------------|--|--|---|
| <i>B. putrificus</i> | 13 | 4.0 | 0.8800 0.9265 | 4.5160* |
| <i>B. putrificus</i> and <i>B. acidophilus</i> | 13 } 143 } | 6.3 | 3.4281 | 17.1405 |
| <i>B. acidophilus</i> | 143 | 7.3 | 3.3354 3.2428 | 16.4455 |
| <i>B. acidophilus</i> | 23 | 5.5 | 3.8450 4.0303 | 19.6885 |
| <i>C. placoides</i> | 54 | 5.4 | 4.9105 4.7252 | 24.0895 |
| <i>L. buccalis</i> | 124 | 3.4 | 0.9265 | 4.6325* |
| <i>C. placoides</i> and <i>L. buccalis</i> | 54 } 124 } | 6.4 | 4.2619 | 21.3095 |
| <i>B. acidophilus</i> , <i>C. placoides</i> and <i>L. buccalis</i> | 23 } 54 } 124 } | 7.6 | 4.7252 | 23.6260 |
| <i>Streptococcus</i> | 177 | 4.1 | 1.8530 1.7604 | 9.0335 |
| <i>Staphylococcus</i> | 87a | 3.6 | 1.2971 1.3898 | 6.7175 |
| Controls: † | | | | |
| Lactic acid solu- tion, none..... | a | 1.8 | 0.7412 | 3.7060 |
| Lactic acid solu- tion, 5 cc..... | b | 5.0½ | 3.7913 | 18.9565 |
| Lactic acid solu- tion, 7.5 cc..... | c | 7.5½ | 4.2546 4.0693 | 20.8100 |

* Practically the same as that for lactic-acid control "a".

† The lactic acid was a normal solution.

§ These values were obtained by direct titration. Judging from the result for "control a," the added lactic acid solution was not exactly normal.

Repetition and extension of these experiments will be made and the results discussed, in the next annual report, in the light of more numerous findings.

The results of these tests that appear to be particularly significant are (a) the lack of decalcifying power by the *B. putrificus*, which Rodella regarded as the etiologic agent in primary decay, also by the *L. buccalis*, a specific mouth form; (b) the relatively slight solvent action of both the streptococcus, considered by a number of modern investigators (Goadby, Baumgartner, *et al.*) as the cause of primary caries, and by the staphylococcus; (c) the marked decalcifying action of the *B. acidophilus* and the *C. placoides*, respectively, especially the latter.

The chemical data of these tests also supplement, in a striking way, the bacteriological findings. The organisms associated with, and predominating in, primary caries ferment the common sugars, readily produce a high degree of acidity, and bring about considerable dissolution of tooth substance. On the other hand, organisms normally abundant in the mouth but not directly related to primary enamel decay, as well as those that are prominent in the later stages of caries, do not produce a high degree of acidity and induce but slight dissolution of powdered tooth.

III. SUMMARY OF BACTERIOLOGICAL AND CHEMICAL FINDINGS.⁹

Material collected from the surfaces and cavities of teeth, in 40 individuals, was studied with the object of determining the numbers and types of bacteria in such deposits, normally and at various stages of decay. Briefly summarized, the results were as follows:

1. Under ordinary conditions the number of bacteria in a milligram of deposit on normal teeth, and cultivable on nutrient agar-plates, was about 1,000,000; when estimated with the microscope, 25,000,000. In "dirty" mouths the counts for dental deposits were about twice as high. The numbers of bacteria on unbrushed teeth were about four times as great as those on brushed teeth, while the count for normal dental deposits obtained immediately after meals was increased about three times that before the meal. In the first stages of caries, the numbers of bacteria in material from enamel cavities were 100 millions or more, whereas in similar material from cavities involving decayed

⁹ This summary relates to papers 2, 3 and 4 of this series (sections 2, 3 and 4, respectively, of the annual report for 1914-'15, by the senior author, to the First District Dental Society of the State of New York.) See footnote 2, p. 445.

pulp there were decided decreases, the numbers falling to about 40 millions per milligram.

2. Qualitatively, the types of bacteria most prevalent in deposits on normal teeth were the cocci, which represented about 75 per cent of the total flora; 40 per cent of the cocci were streptococci. In the primary stage of caries the relative abundance of types was different from that in deposits on normal teeth; only 40-50 per cent of the forms were cocci, while the percentage of thread-forms rose to about 30 per cent (an increase of about 200 per cent), accompanied by a correspondingly large increase in the number of the non-spore-forming, actively acid-producing rods. In decay of the pulp, on the other hand, the cocci remained low in proportion, the thread-forms almost disappeared, the non-spore-forming rods continued to be quite as numerous as they were in the primary stages of caries, but a new form—an anerobic, putrefactive, spore-bearing rod—was found in large numbers.

3. From the chemical standpoint, almost all these organisms are capable of fermenting glucose and maltose; a majority of them also ferment either lactose or sucrose, or both. The cocci usually ferment each of these four sugars, and produce, thereby, moderate degrees of acidity. The non-spore-forming rods ferment glucose, maltose and lactose, with high degrees of acid-production, but usually fail to act on sucrose. The thread-forms, on the other hand, ferment glucose, maltose and sucrose but not lactose. The short-thread form (*C. placoides*) produces considerable quantities of acid and has the property of clinging to smooth surfaces. The putrefactive variety ferments sugars, but in their absence is highly proteolytic, digesting serum, casein and gelatin very rapidly, under anerobic conditions.

4. Salivary mucinate acted as a stimulant (nutrient?) for the growth of the leptothrix type, but had no appreciable effect on other forms. There was no appreciable action of the bacteria on sodium mucinate in the few experiments conducted in this connection.

5. The bacterial types usually found in the deposits on normal teeth exerted but slight solvent action on powdered tooth in 1 per cent glucose-broth, whereas the types that prevailed in

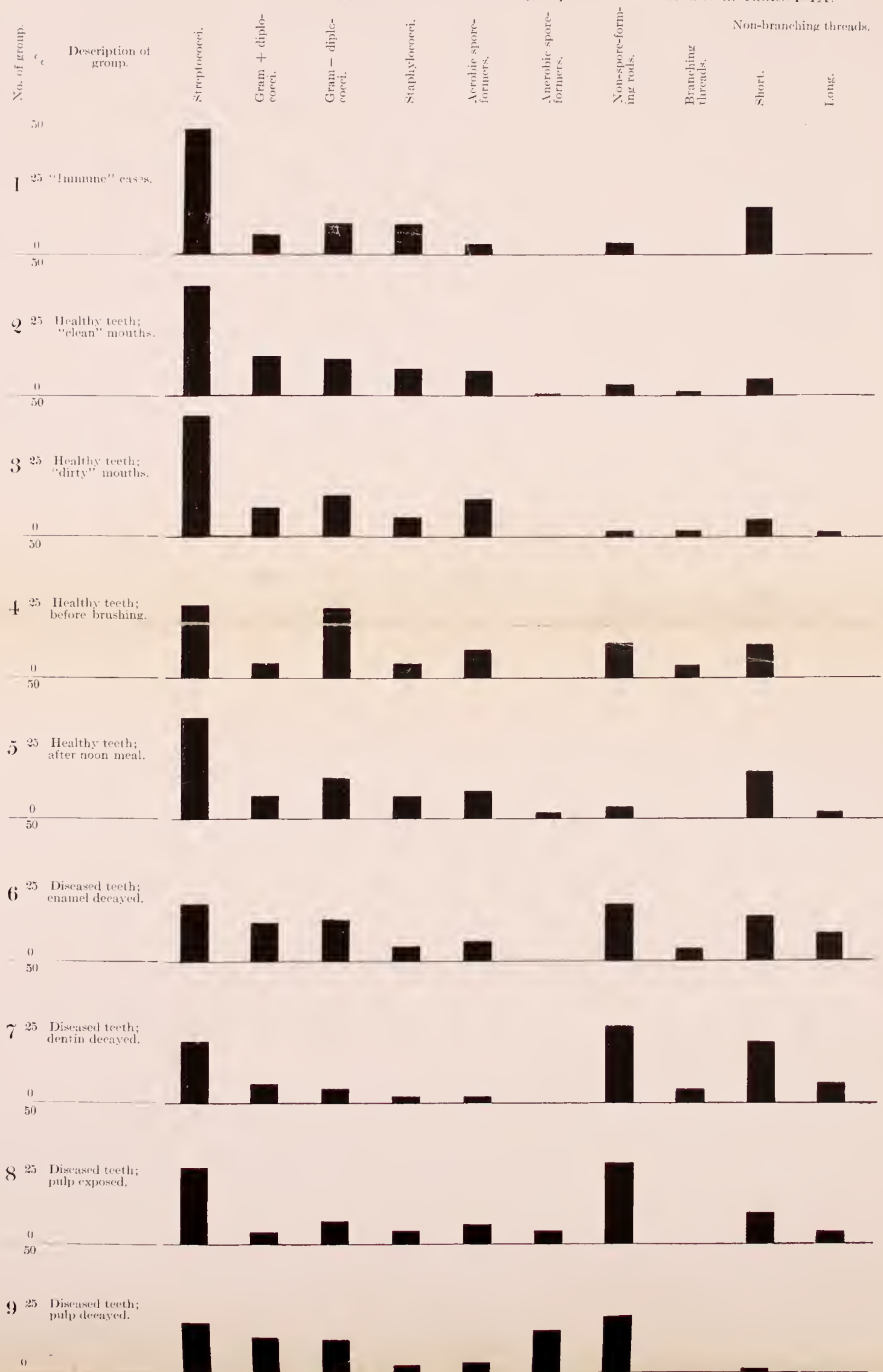
CHART C (SEE TABLE XII)

Percentages of the total number of dental specimens, for each of the nine groups of teeth referred to in Tables I-IX, in which each type of isolated bacteria was found.



CHART D (SEE TABLE XIV)

Percentage of each type of isolated bacteria for each of the nine groups of teeth referred to in Tables I-IX.



cavities in the first stages of enamel decay brought about marked dissolution of the powder. Putrefactive organisms from decayed pulp were devoid of solvent action on powdered tooth in glucose-broth.

IV. CONCLUDING DISCUSSION.

The results of the various experiments described in this report exhibit marked unity, which becomes more apparent when we consider the nature of, and the effect of certain environmental factors on, bacterial activity. Under a given set of imposed conditions bacteria tend to behave in a certain definite and constant manner. In a pure culture it is a relatively simple matter to ascertain the reactions between a given organism and a particular environment. Under conditions as they exist in nature, however, where organisms live in groups of families and communities [what Marshall (2) calls microbial associations], there are other factors to consider, *e.g.*, shifting environment, effects of various types of bacteria on one another, and special modifications of the environment itself by one or more of the existing types that render it favorable or unfavorable to the others. For example, *B. putrificus* is a strict anerobe and alone will not grow in the presence of free oxygen. In association with an aerobic form, however, it grows readily even in the presence of free oxygen. Under natural conditions there is, furthermore, a succession of types due to shifting of the environment. This is prominently brought out and taken advantage of in the purification of sewage, where, with a change from an anerobic to an aerobic environment, flora may be transformed from a putrefactive to an oxidative character.

The effect of environment as a selective agent, has been especially noted for the intestinal flora of man and animals, and has recently been brought under experimental control. Thus, Herter and Kendall (1) transformed the flora of monkeys and cats by feeding either a carbohydrate or a protein diet. In the former instance an acidific, in the latter a proteolytic, flora was established in the tract. Last year Rettger (3, 4) and his associates obtained similar results with white rats and chickens. Torrey (5) was able to transform the flora of typhoid patients

by means of specific diets. In all these experiments carbohydrate feeding promptly brought about a preponderance of the acidophilic types. In all these instances the balance was merely shifted, the power of one type of bacteria having been enhanced, that of another type suppressed. Under no condition, apparently, was either type completely eradicated.

These observations have a definite bearing on the conditions in the mouth and the factors influencing decay. The mouth is in many respects similar to the intestinal tract. Like the tract, it is sterile at birth and, thereafter, constantly receives a large and multifarious supply of bacteria. Stagnant conditions characteristic of the intestine also exist in the mouth to some extent, during sleep particularly, but the mouth receives many forms that never survive passage through the stomach. Furthermore, the medium in the mouth is lymph-like and generally carbohydrate-containing, while that of the intestine is highly nitrogenous. In consequence of this environmental difference, the characteristic flora of the normal mouth is one that produces acid to a moderate degree (cocci), while that of the intestine usually shows a dual nature—both fermentive and putrefactive (*coli*, *proteus*, etc.).

Stagnant conditions in the intestine effect concentration of proteins and consequent predominance of proteolytic flora. Stagnation in the mouth, on the other hand, induces concentration of fermentable carbohydrate. As a consequence, conditions in the mouth are similar to those in the intestine after ingestion of a carbohydrate diet. A corresponding change in the flora would be expected to follow such a condition. This is exactly what occurred in the case of the unbrushed teeth, where the acidific types began to assert themselves as a result of the stagnant condition in the mouth during the night. If, now, this stagnant condition were not temporary and general, but permanent and local, such as follows the lodgment of a particle of meat in a crevice in a tooth or in a space between teeth, the protein would remain practically unaltered by the saliva and by the bacteria which, excepting certain anerobic forms such as *B. putrificus*, have hardly any action on complex proteins in general. Starchy food, on the other hand, if localized against teeth, is hydrolyzed by salivary amylase and the resultant sugar is promptly converted by bacteria

into acid, leading to stimulation of the growth of highly acidific forms and to consequent suppression of the others. This condition was noted in the primary stages of caries, where the *B. acidophilus* came prominently to the fore, and explains why dental crevices and interspaces are favorable points for the initiation of caries.

On the whole, then, there are conditions and phenomena in the mouth that are analogous to those occurring in soil, in sewage purification, in the intestinal tract, and elsewhere, where associative bacterial activity exists, and where sudden and radical changes in the environment take place, either from the standpoint of the concentration of oxygen or the character of the nutrients.¹⁰

These observations support the suggestions and inferences by the senior author, in preceding annual reports, which led to the initiation of the studies of which this section of the report for 1914-'15 is a part.

V. SUMMARY OF GENERAL CONCLUSIONS.

1. The flora of deposits on normal teeth was constant within certain limits. While the absolute numbers fluctuated with the condition of the mouth, teeth, etc., the relative abundance of the different types remained approximately the same.

2. The stagnant condition in the mouth during the night, and the ingestion of food, caused marked increase in the number of bacteria in deposits on normal teeth, in the former instance shifting the relative abundance of types. The results indicate, in accord with prevailing opinion in regard to oral hygiene, that washing the teeth before retiring is very desirable, and that rinsing the mouth after each meal is just as expedient a habit to cultivate as washing the hands before a meal.

3. The early stages of caries are characterized by a decided alteration in the relative abundance of types as they occur in deposits on normal teeth. Three forms, the *B. acidophilus*, the *C. placoides* and the *L. buccalis*, were prominent in the carious enamel deposits.

¹⁰ See pp. 312-314 of the third paper in this series: *Journal of the Allied Dental Societies*, 1915, x.

4. In pulp decay an anerobic, spore-bearing, putrefactive bacillus, *B. putrificus*, was always prominent.

5. The organisms prevalent in primary enamel decay very actively ferment the common sugars and bring about comparatively great dissolution of powdered tooth. The organisms in deposits on normal teeth and in the later stages of caries exert either slight effects, or none at all, in these relations.

*Bibliography.**

1. HERTER and KENDALL: *Jour. Biol. Chem.*, 1910, vii, p. 203.
2. MARSHALL: *Science*, 1915, xli, p. 306.
3. RETTGER and HORTON: *Cent. f. Bakt. (Orig. I)*, 1914, lxxiii, p. 362.
4. RETTGER: *Jour. Exp. Med.*, 1915, xxi, p. 365.
5. TORREY: *Jour. Inf. Dis.*, 1915, xvi, p. 72.

* Additional items in the bibliography of this series (2, 3, 4) appear on pages 165 and 329 of this volume.

CHEMICAL STUDIES OF THE RELATIONS OF ORAL
MICROÖRGANISMS TO DENTAL CARIES.¹

BY WILLIAM J. GIES AND COLLABORATORS.

5. Tests of Some Biochemical Activities of Oral Bacteria.

BY LOTTIE M. HULL AND JEANNETTE C. MULLIKIN.

(From the Biochemical Laboratory of Columbia University, at
the College of Physicians and Surgeons, New York.)

The experiments referred to in this brief paper were performed during the progress of the work described in the preceding sections of this report (1-4) and were conducted in harmony with the plans suggested in the first of the series.

I. THE DEGREE OF FERMENTATION OF CERTAIN SUGARS BY TYPICAL
ORAL BACTERIA, AS MEASURED BY THE RESULTANT
AMOUNTS OF ACID.

Media were made from "meat infusions," by standard methods.² Equal portions containing the sugars (1 per cent) to be tested were tubed and then sterilized, in an Arnold steam sterilizer for 30 minutes, on three successive days. After suitable periods of incubation (1-7 days), 5 cc. portions of the cultures were titrated with *n*/20 sodium hydroxid solution, phenolphthalein serving as the indicator. The titrations were made in duplicate.

Each figure in the accompanying table (Table 1) represents the number of cubic centimeters of normal hydroxid solution required to neutralize 100 cc. of culture medium, and expresses average acidity for several cultures of the type of organism indicated.

¹Fifth section of a report of findings in investigations, for the year 1914-'15, under the auspices of the First District Dental Society of the State of New York. See this issue (*Journal of the Allied Dental Societies*, 1915, x), footnote 1, p. 464.

²See report to the American Public Health Association: *Standard Methods for the Examination of Water and Sewage*, p. 77; 1912.

TABLE I.—DATA PERTAINING TO THE AMOUNTS OF ACID PRODUCED BY ORAL BACTERIA IN MEDIA CONTAINING DIFFERENT SUGARS.

| Type of Organism | Sugar | | | | Average |
|----------------------------|---------|---------|---------|---------|---------|
| | Glucose | Sucrose | Maltose | Lactose | |
| <i>D. flavus</i> | 2.5 | 2.6 | 2.7 | 0.6 | 2.1 |
| <i>Staphylococcus</i> | 4.5 | 2.5 | 3.1 | 4.5 | 3.6 |
| <i>Streptococcus</i> | 4.2 | 4.2 | ... | 4.0 | 4.1 |
| <i>B. acidophilus</i> | 5.6 | 0.9 | 5.4 | 5.8 | 4.4 |
| <i>C. placoides</i> | 3.2 | 4.3 | 3.7 | 0.5 | 2.9 |
| <i>L. buccalis</i> | 3.9 | ... | 2.7 | 0.4 | 2.3 |
| <i>Actinomyces</i> | 1.9 | 0.2 | 0.4 | 0.6 | 0.8 |
| (Average)... | 3.7 | 2.4 | 3.0 | 2.3 | ... |

The results in Table I show (a) that glucose and maltose were more actively fermented, in general, than either sucrose or lactose; (b) that *B. acidophilus* was the most acidific form in all instances except one (sucrose); and (c) that, in most cases, a given type of organism produced approximately uniform amounts of acid from at least three of the four sugars involved.³ The comparatively high acid-potentials of sucrose (cane sugar) and of maltose (sugar produced from starch in salivary digestion), in the presence of *Cladothrix placoides*, may be particularly significant, in the light of the facts regarding the forces involved in the initiation of dental caries, that are briefly summarized in the succeeding paper.⁴ In this connection, also, the marked fermentive action on glucose, maltose and lactose by *B. acidophilus*, which accompanies *C. placoides* in the material in enamel cavities, is a matter of special interest. Between them, these two bacterial forms, which may grow actively in each other's presence, ferment the four common sugars with particular avidity.

³ The data in this relation were derived from tests conducted with the help of Dr. I. J. Kligler, as stated on p. 446 of the preceding section (*Journal of the Allied Dental Societies*, 1915, x), and are given here for the sake of completeness in the presentation of the results obtained by Misses Hull and Mullikin with the coöperation of Dr. Benjamin Horowitz (W. J. G.).

⁴ Gies, *Journal of the Allied Dental Societies*, 1915, x, p. 464.

II. THE ACTION OF ORAL BACTERIA ON SODIUM MUCINATE IN
AQUEOUS SOLUTION.

We endeavored, in preliminary experiments, to determine whether salivary mucinate is materially changed by the action of oral bacteria, when added (in saliva) to non-sterile aqueous solutions of sodium mucinate.⁵ We proceeded as follows: Aqueous 0.1 per cent solution of sodium mucinate (500 cc.) was treated with 20 cc. of mixed saliva obtained from several persons. Of this solution of mucinate, six 10 cc. portions were immediately titrated, for acidity, with $n/200$ sodium hydroxid solution, phenolphthalein serving as the indicator; for alkalinity, with $n/200$ hydrochloric acid solution, methyl orange or para-nitro-phenol serving as the indicator. After incubation for several days, the liquid emitted a strong wine-like odor and contained a flocculent precipitate, presumably of mucin. Portions of the solution were titrated, as before, at intervals during periods of 6-19 days.

Acidity as well as alkalinity increased during the first week; acidity then began to decrease, alkalinity increasing steadily as putrefactive bacteria proceeded to outnumber the fermentive organisms. Five such mixtures gave essentially the same results. The accompanying table (Table 2) presents, by way of illustration, the titration data for our shortest and longest experiments in this connection.

⁵ Pure sodium mucinate, from the senior author's stock supply, was used.

TABLE 2.—DATA PERTAINING TO THE PRODUCTION OF BASIC AND ACIDIC MATERIALS, FROM SODIUM MUCINATE, BY ORAL BACTERIA.

| Experiment No. | Elapsed time: days | Titration data, in duplicate determinations, expressed as number of cc. of $n/200$ solution required to neutralize 10 cc. of culture* | | | | | |
|----------------|--------------------|---|-----|-------------------|------|-------------------|-----|
| | | Sodium hydroxid | | Hydrochloric acid | | | |
| | | Phenolphthalein | | Methyl orange | | Para-nitro-phenol | |
| I | 0 | 1.4 | 1.4 | 4.0 | 3.5 | 3.4 | 3.5 |
| | 2 | 2.5 | 2.4 | 5.5 | 5.7 | 5.1 | 5.2 |
| | 6 | 5.8 | 5.3 | 7.0 | 7.0 | 7.8 | 8.0 |
| IV | 0 | 0.7 | 0.8 | 5.7 | 5.3 | 4.3 | 3.9 |
| | 2 | 5.7 | 5.2 | 6.9 | 6.1 | 5.8 | 5.6 |
| | 6 | 5.9 | 7.1 | 12.5 | 11.3 | 6.4 | 6.2 |
| | 8 | 5.0 | 6.0 | 14.9 | 13.9 | 7.8 | 7.8 |
| | 14 | 3.3 | 3.9 | 8.0 | 7.7 | 3.6 | 4.8 |
| | 19 | 2.5 | 2.8 | 12.6 | 11.4 | 8.1 | 8.6 |

* As a rule the duplicate determinations were made by different observers.

Shifting results such as those in Table 2 are evidently due to ordinary changes in the balance between dissimilar types of microorganisms in "mixed cultures," with consequent cumulative production of excesses of particular substances by the predominant forms. That too much significance may be attached, occasionally at least, to numerical values obtained for acidity, as indicated by phenolphthalein, is suggested by the data in Table 2. That carbon dioxid is an important factor in such acidity is a fact to which too little attention has been paid. That there may be different degrees of solvent action on such materials as powdered tooth, by *numerically equivalent degrees of bacterial acidity*, because of different proportionate contents of carbon dioxid (to say nothing of other variable acidic factors) is obvious.⁶ These points will receive special attention in extensions of these experiments during the year, when we hope to study, also, the nature and extent of the changes produced in mucinate by pure bacterial cultures under conditions analogous to those that prevail in the mouth, with particular reference to the action, if any, of

⁶ See page 455 in the preceding section of this report. *Journal of the Allied Dental Societies*, 1915. x.

resultant products on enamel. The fact that mucin is a *gluco*-protein is very suggestive of the possibility that salivary mucinate may yield radicals capable of supporting acid fermentation, for a time at least; and that some of the products of such fermentation might be significant factors in the initiation of dental caries.

III. DO ORAL BACTERIA HAVE THE POWER OF REMOVING SULFOCYANATE FROM SALIVA?

The possibility that sulfocyanate varies in proportion, in mixed saliva, because of bacterio-chemical alterations of it, such as its oxidation to sulfate, does not appear to have received special attention.⁷ We have performed a few initial experiments in this connection, each of which was conducted as follows:

To each of three similar series of test tubes of equal sizes were added respectively 10 cc. of solutions of potassium sulfo-cyanate in water, in the following concentrations: (1 in) 5000, 10,000, 20,000, 40,000, 80,000. The first series were used as "water-controls." To each of the second set was added 1 cc. of *boiled* saliva; to each of the third set, 1 cc. of *unboiled* saliva. All the saliva used in a given experiment was taken from a supply of mixed unfiltered secretions. After incubation for a week, 2 drops of 10 per cent hydrochloric acid solution and 5 drops of 5 per cent ferric chlorid solution were added to and mixed with the contents of each tube. The comparable *salivated* mixtures yielded less ferric-sulfocyanate coloration in each tube than did that in the corresponding control; and the colors of the mixtures to which boiled saliva had been added were more decided, as a rule, than those that received unboiled saliva. The differences were not striking enough, however, to be conclusive. Several additional tests gave similar results.

It remains to be determined whether the observed differences were due to interference with the test by salivary constituents, bacterial bodies and products, etc., or whether the proportions of sulfocyanate were actually reduced by the action of the bacteria introduced with the saliva. Quantitative experiments along these lines are in progress.

⁷ Fluctuation in the proportion of salivary nitrite, due to bacterial influence, was shown by Lothrop and Gies. Under similar conditions, in a few tests, sulfocyanate appeared to be unchanged. *Journal of the Allied Dental Societies*, 1910, v, p. 277; 1911, vi, p. 70.

CHEMICAL STUDIES OF THE RELATIONS OF ORAL MICROÖRGANISMS TO DENTAL CARIES

BY WILLIAM J. GIES AND COLLABORATORS.

6. Retrospect and Prospect.¹

BY WILLIAM J. GIES.

(*From the Biochemical Laboratory of Columbia University, at the College of Physicians and Surgeons, New York.*)

I

Mr. President and Fellow-members of the First District Dental Society:—I am celebrating, to-night, the fifth anniversary of my first appearance before this Society as a director of research under your auspices. I shall never forget that first meeting. Dr. J. Morgan Howe presided. His personal attitude toward the speaker was that of a doting father toward a son. His introduction of the speaker evidenced his pride in the fact that *research had been started!* He moved to a place in the middle of the front row of seats in order that he might follow every detail of the lengthy statement. While the report was being presented he sat in close attention, his face wreathed in smiles of approbation and his head repeatedly nodding in hearty assent. *Even the wholly negative character of the reported findings did not disconcert him!* My "revolutionary" proposal that "food-acid" media might be physiologically useful and desirable for the removal of mucin plaques from the teeth—two years before the appearance of Pickerill's book—did not destroy his confidence in my judgment. The intimation that the "systemic condition" of the individual might be an important factor in susceptibility to dental caries proved to be in accord with his own

¹ Sixth section of the report, for 1914-'15, of findings in investigations conducted under the auspices of the First District Dental Society of the State of New York, and presented, at the meeting of the Society, at the New York Academy of Medicine, November 1, 1915. (See the *Journal of the Allied Dental Societies*, 1915, x, pp. 137, 141, 282, 445, 459.)

belief. My suggestion that we abandon, for a time, the line of inquiry *in which he had been most interested*, which he had believed was most immediately promising of fruitful results, and "project our further study along bacterio-chemical lines," received his cordial support. He was open-minded, hopeful, and a true liberal.

The research I have had the opportunity and the pleasure to do and to guide, under your auspices, was begun at the suggestion of J. Morgan Howe. I never met him before our first conference on dental research, during the summer of 1909; but with his first comment on the subject of the need for chemical research in dentistry, I realized that although I was listening to the words of a man of many years, I was receiving the thoughts of a spirit of perennial youth. His ardent devotion to his profession; his earnest hope to see dentistry achieve its highest usefulness *as a profession*; his constructive criticism of deplorable educational, journalistic, and scientific conditions, that then prevailed in dentistry; his broad and optimistic outlook; his personal and professional altruism; his exalted ethical standards—all were elements in an irresistible appeal; and when he asked me point-blank whether I should be willing to conduct research in dental problems, under conditions that he regretted would offer "very little inducement," we clasped hands in a lasting agreement, to go forward along the way he pointed out, without reference to funds beyond the minima to support the work.

Since your last annual meeting John Morgan Howe passed away into the loving and abiding memory of all who knew him. The impress of his personality upon me is a constant inspiration. It grows deeper as the days go by. If I should ever have the good fortune to advance, in any degree, the science of dentistry, it would be due wholly to John Morgan Howe's spiritual heritage in behalf of the profession of his faith and devotion.

II

My sixth annual report is presented, to-night, under very unconventional circumstances. Three sections of it have already been published in the June and September numbers of the *Journal of the Allied Dental Societies* (pp. 137, 141 and 282), the very

bulk of these sections making such preliminary presentation desirable.

[At this point in his oral report, the author briefly reviewed the gist of the published sections referred to, gave an outline of the two additional bacterio-chemical sections preceding this one in this issue (*Journal of the Allied Dental Societies*, 1915, x, pp. 445, 459), and then proceeded to state the substance of the general deductions in the following summaries.]

III

At the conclusion of our first annual report to your Society, after calling attention to the negative findings in a purely salivary study of dental caries, we said: "That the *systemic condition* of the individual is an important factor in susceptibility to dental caries is a conviction that we cannot dismiss. *Nevertheless, direct external attack upon teeth by microorganisms appears to be the most important single factor in the carious processes.* Mucinous plaques afford favorable conditions for such external attacks. We shall be glad, with your approval, to project our further study along bacterio-chemical lines."²

In an extension of that report we published a memorandum on "plans for further work."³ Among the seven general items in that memorandum were the following:

1. Ascertain the most favorable conditions for the growth and cultivation of microorganisms connected directly or indirectly with the leading types of dental disease.

4. Establish the chemical and physico-chemical nature of so-called mucin, in order to obtain a better understanding of its possible chemical and physical influence in plaque formation.

5. Learn the physical and chemical conditions of plaque formation, from chemical and bacteriological studies of plaque scrapings ("dental deposits") as well as of artificial plaque cultures by the "lamb-broth method" and other processes.

6. Study the action of food-acids on the enamel and dentin of natural (extracted) teeth.

7. Find suitable agents for the disorganization of existent plaques on tooth-surfaces and for the possible prevention of plaque formation.

² Lothrop and Gies: *Journal of the Allied Dental Societies*, 1910, v, p. 283.

³ Lothrop and Gies: *Ibid.*, 1911, vi, p. 90.

During the year 1910-'11 we gave special attention to item 1 in the above series, and found the situation chaotic in high degree. We learned little more of real value from our study of the then literature of the subject, however, than the broad fact that although there were many names and descriptions for oral bacteria, it was impossible to regard many of the organisms as distinct forms. Published statements regarding the morphology, biology and chromology⁴ of the types, and the frequency and conditions of their occurrence, were so incomplete or so inadequately outlined that identifications, from either historical or observational standpoints, were impossible. Even Miller's classic studies were based on morphologic distinctions that fail to meet present day requirements in bacteriologic differentiation.

In our first experimental efforts in this connection we learned to appreciate the difficulties in the way of effective work; also, "what not to do" in certain directions and how to proceed in others. Coccus forms, also thread-forming organisms, were among the types distinguished. Mixed cultures actively fermented each of the common sugars, with abundant acid formation; and the resultant acid cultures exerted marked solvent action on the enamel of normal human teeth immersed in them, as was indicated by the ensuing extraction of calcium. Mixed cultures from the teeth of Miss D, "a case of perfect immunity (against all dental diseases), extracted practically as much calcium as any culture from decay cases."⁵

During the years 1911-'12, '12-'13, and '13-'14, we gave special attention to items 4 and 6 in the memorandum referred to on p. 466, as a further preliminary to a thorough eventual bacterio-chemical study of the problem of dental caries. During this period the bacteriological literature of the subject was given more intensive study, with consequent increased comprehension of both its value and deficiency, and of the requirements for such work as this report describes.

⁴ I have been using this word to indicate, conveniently, our classified knowledge regarding the *staining properties* of microorganisms. This explanation was inadvertently omitted from the third section of this report, where I publicly used it for the first time. *Journal of the Allied Dental Societies*, 1915, x, p. 315 *et seq.*

⁵ Lothrop: *Journal of the Allied Dental Societies*, 1911, vi, p. 297.

Last fall we began the bacterio-chemical work which Dr. Kligler, and Misses Hull and Mullikin, have very effectively carried to a stage of definiteness that affords a firmer footing for further developments.

IV

The bacterio-chemical work of the past year, in pursuance of the general plan that was outlined in the first section of this report, was directed primarily to a determination of the kinds and qualities of bacteria in deposits on, and in material from cavities in, human teeth. We believe that so far as we have been able to proceed, the results of this study are accurate, but the observations must be repeated and very widely extended before the data can be regarded as conclusive. The variables in such work are very numerous, and the personal equation itself is a factor of greater unavoidable uncertainty in bacteriological research than in investigations that are either purely physical or strictly chemical. We are disinclined, therefore, to attach undue importance either to our differential or to our mathematical data, and await the accumulation of the results of our further work, by repetition and extension, before attributing to our present findings an unmistakable significance.

Although a relatively large number of definite types have been identified, classified and studied, numerous additional forms will require detailed attention. We believe we have merely peeped into a room full of many interesting and important exhibits.

This "peep into a room full of many interesting and important exhibits" revealed the presence there of three conspicuous bacterial forms of special interest: *Cladothrix placoides*, *Leptothrix buccalis* and *Bacillus acidophilus*. These three types were particularly prominent in material from cavities in superficial enamel decay. We have provisionally regarded two of these three forms (*C. placoides* and *B. acidophilus*) as possibly directly responsible factors, individually or together, in an infection that is productive of the *initial* stage of dental caries. (That coccus forms are vanguards in this attack is a possibility we have not excluded). These types (*C. placoides* and *B. acidophilus*)

grow vigorously in each other's presence, are actively fermentative in power, are capable of producing relatively large amounts of dentally destructive acid from the common sugars in ordinary culture media ("acidific"), and obviously can withstand the action of comparatively large proportions of the acid products of their own individual and associative fermentive activity ("acidophilic").

Cladothrix placoides is notable, also, from the fact that, growing in relatively large colonies, it *adheres tenaciously to smooth surfaces* and tends to enclose in its colonies groups of other bacteria. These qualities suggest that this organism may be an important mechanical and chemical factor, ordinarily, in fixing, segregating and concentrating acidific forces on teeth, and in initiating and facilitating, thereby, acidic disintegration and penetration of enamel at such focal points. When we further reflect that viscid mucinate and delicate mucin threads would tend, respectively, to be adsorbed by, and entangled among, such adherent masses as *C. placoides* might be expected to develop at focal points on teeth, a mode of origin of "mucin plaques" is at once suggested. A further fact of possible special significance in this particular connection was the observation, in our preliminary experiments in this regard, that sodium mucinate *stimulated growth of the two thread-forms* (*C. placoides* and *L. buccalis*)—presumably by providing *especially suitable nourishment!* Possibly mucinate and mucin, in mucin plaques, *stimulate the growth of acidific forms*, as well as provide more or less mechanical superficial protection to the bacterial colonies in the mucinous films? If, *after further study of the facts*, these coördinations of ideas should prove to be the story of essential truth in this situation, it is evident that there would be marked protective advantage in the use of a suitable "food-acid" dentifrice for the gross disintegration of mucin plaques, followed at once by the employment of an alkaline, antiseptic, sialogenous mouth-wash, for the comparatively complete removal of persistent, focally *adherent* microorganisms and the neutralization of such residual focalized acid as might otherwise remain. Either this double treatment, presumably as the best prophylactic procedure, or exclusion of fermentable matter from the saliva or diet, or both.

[Is it possible that dental caries is dependent primarily upon the presence, in the mouth, of carbohydrate *food* remnants and their products, and that caries would not occur in the absence of fermentable *food* residues? Can any dentist, or any one else, answer the following questions, *from knowledge derived directly from experience*: Do the teeth of animals that are strictly carnivorous *invariably* remain free from caries? Are there any herbivorous or omnivorous animals whose teeth do not tend, sooner or later, to become more or less carious? I should be glad to correspond on this subject with any one who could and would coöperate with *precise answers* to these questions, with a view to extended bacterio-chemical research in this field.]

In the foregoing discussion "mucin plaque" is used conveniently to refer to any mucinous mass on teeth. The remarks in which this phrase is used are not intended to suggest a belief that dental caries occurs *only* through the mechanical intervention of such mucinous masses.

It was stated above that we have not excluded the possibility that "coccus forms are vanguards in the attack" that results in acidic penetration of enamel and the sequelae in caries. A detailed bacterio-chemical study of deposits over and about points on teeth showing the earliest possible insignia of decay must precede final conclusions on this point. It is by no means impossible that coccus forms *initiate* the solution of calcium and phosphate from enamel, and that *C. placoides* and *B. acidophilus* are stimulated to specially destructive focalization, with a diminishing proportion of coccus associates, as a result of local availability of special quantities of soluble calcium and phosphate produced in the manner suggested. The data in Table XXIV in the fourth section of this report (*Journal of the Allied Dental Societies*, 1915, x, p. 452), as compared with the similar data in Table XXII in the same section, suggest that the growth of coccus forms may be inhibited by calcium phosphate and other calcium salts, but that the growth of *C. placoides* and *B. acidophilus* may be stimulated by such calcium compounds. I shall look carefully into these matters in the near future, and also give attention to the possible protective rôle of Nasmyth's membrane in this connection.

V

As the experimental data, on which the foregoing opinions and reflections are based, accumulated, I recalled the problem of "sulfocyanate in its relation to plaque formation," and the perplexities of several Research Committees of the Dental Society of the State of New York in this connection—and my own efforts to contribute to the solution of the problem; and I wondered whether the plaques that were obtained by some of the workers in those studies were available because *Cladothrix placoides* was sufficiently involved to produce them, and whether the plaques that were expected by other workers, but which were not obtained, were missing for the opposite reason. I suspect that such a "variable" has been responsible for some of the confusion in the past, in this connection, and propose to look into the matter again by studying the behavior of *C. placoides* in lamb-broth media; also by inquiring into the related points that may be suggested by any positive results of such a re-examination.⁶

VI

We are endeavoring to determine the sequence of influences that collectively induce dental caries. We hope, from a full ultimate understanding of the cause, to devise and suggest means for the prevention of dental caries. If current opinions are correct, bacteria are the primary factors in the attack, and acids the chemical agents in destructive penetration of the enamel. After acidic penetration of the enamel and exposure of the dentin, the carious process appears to be decreasingly acidic and increasingly zymolytic—penetrative fermentation is followed by disintegrative putrefaction. Putrefactive bacteria, among them *B. putrificus*, are conspicuous in decaying pulp. But, however interesting may be the details of pulp putrefaction or dentin disintegration, our primary aim in the study of dental caries must be to learn fully the cause, and then to recommend measures that would prevent the incidence, of focal enamel erosion—of focal exposure of the putrefactive dentin. Which bacterial types, and

⁶ For details in the matter alluded to above, in general, the reader is referred to the annual report by Dunning, containing data presented by Seaman and Gies, *Dental Cosmos*, 1910, lli, p. 1141.

how many, are causatively involved in superficial enamel decay? *We do not know.* Is dental caries due to a *specific* form or forms of microorganisms—or is it a casual consequence of acid focalization by any one or more of *many* acidific types? *We cannot say.* Do the oral fermentation-acids differ significantly in their destructive potentials? Presumably, but *we do not know what kinds of acids are operative in dental caries.* Which oral conditions particularly favor, which effectively impede, the growth of microorganisms that attack the enamel? *We continue largely in the dark in this regard.* What is the relation of salivary secretion or excretion, or both, to the onset of dental caries? *Wholly problematical.* What variations in the constitution of enamel, if any, influence the incidence of caries? *No evidence.* What measures are best adapted for the highest degree of successful oral prophylaxis against caries? *Nobody knows*—and it is likely that, until we fully understand the specific *coördination of causative factors*, nothing less than recurrent destruction of all oral microorganisms, or their *complete* mechanical removal repeatedly from all parts of all the teeth, can be regarded as effectively preventive of the disorder.

I am sure you will agree that it is unnecessary for me to proceed further with hypothetical questions and answers to emphasize the conclusion that a broad and comprehensive extension of our bacterio-chemical study is the urgent feature in a program that our recent findings, added to the earlier results, render all the more interesting, suggestive and promising.

If any reader of these reports should be inclined to believe that I unduly minimize the automatic significance of some of our findings, let me assure him that my “constructive imagination” is in very good order *as a guide to further research*; but that I am unwilling to permit it to mislead me into snap judgments that might retard rather than advance our progress in this field.

VII

I am about to endeavor, with the aid of every available resource, and the coöperation of all whose practical help may be

given, to solve the problems that are indicated, *in general*, by the following questions (1-5):

1. Which types of microorganisms, capable of producing and maintaining the conditions that seemingly *initiate* dental decay, occur invariably in the deposits on human teeth *immediately over or surrounding points that show the earliest possible detectable dissolution of enamel in typical primary superficial caries?*

2. Do any, and if so which, of the microorganisms in such dental deposits as those referred to above (1) occur in deposits on teeth in the mouths of (a) men and women, white and black, and of (b) mature dogs and other animals, who are *perfectly* "immune" from dental caries?

3. What are the distinguishing morphologic, chromologic and biochemic qualities and peculiarities of the types of microorganisms that are responsible for the earliest phases of dental caries (1, 2)?

4. What artificial conditions, analogous to those in the mouth and on the dental surfaces, favor the growth, focalization and erosive action of the types of microorganisms that are responsible for the onset of dental caries (1, 2)?

5. Which conditions, present in "immune" mouths or that might be instituted in human mouths prophylactically, would destroy, or prevent the growth and focalization of, the types of microorganisms that are responsible for the inauguration of dental caries?

The drift, import, and practical character, of this program are self-evident. The prophylactic measures consequent upon solution of these problems would probably be self-suggestive.

The coöperation of dentists in any way that would facilitate this endeavor in any of its phases, especially by putting me in touch with cases of perfect "immunity," is earnestly invited. (The author's laboratory address is 437 W. 59th St.; telephone number, Columbus 9511.)

VIII

[The remaining sections of the report for 1914-'15, which

the author outlined in his oral statement, refer to the action of food-acid media on teeth (including the final portion of the report for 1913-'14); also to Marshall's salivary coefficient as an index of dental caries, to the reaction of saliva, and to the direct action of sugar on teeth. Each of these sections will be published in the succeeding issue—*Journal of the Allied Dental Societies*, March, 1915.]

"CAN I BE A BETTER DENTIST?"¹

BY CHARLES F. ASH, D.D.S., NEW YORK CITY

What are the reasons which impel so many to attend our National and State meetings? A few attend solely for the recreation and good fellowship to be found, certain other few in the interest of dental politics, and a few others to see what new things the manufacturers have to offer; but it is reasonable to suppose that most of the men attending our conventions, go because they want to be better dentists. Otherwise why waste the time?

There are so many standpoints from which to view this subject that one hardly knows where to begin. Let me, in the first place, beg each man here to put the question seriously and honestly to himself. Can I be a better dentist?—with the emphasis on the word *can*. Now answer the question to yourself with Yes or No. *Can* I be a better dentist? I must assume that every man who has answered truly to himself has answered Yes. If then we *can* all be better dentists, the next question in natural sequence must be—Do you want to be a better dentist? Oh yes! Of course I want to be a better dentist—all right—now comes a crucial question. Why am I not a better dentist? Put this question squarely up to yourself, nobody else need know the answer, but at least be honest with yourself, tell yourself the real truth. This is not so easy, as we are all so prone to make excuses for ourselves that we rarely tell ourselves the exact truth; but now, be honest with yourself and what is the answer? If the answers were written out and collected, the tellers would report that the majority would be covered by two words—laziness and indifference. If either of these answers are true, then you have been your own jury and convicted yourself of dishonesty, for, if for any reason you are not giving your patients the best service of which you are capable, then you are not fair to your patients, and unfairness in this connection is synonymous with dishonesty. What I mean is this: Are your cavities properly prepared? Are

¹ Read at the fifty-first annual meeting of the Mass. Dental Society, May 5, 6 and 7, 1915.

they properly contoured? Are the fillings properly inserted? Are they properly finished at the margins and properly polished, or could you improve them a little in any one respect?

If you can improve them a little, then it's that little improvement for which I am pleading. But who puts in the other fillings? The ones we see every day, many of recent origin which we must condemn and remove and replace with better ones. Who left the little decay under those fillings? Who left a fringe of rough gold or amalgam under a gingival margin to start irritation and recession of the gums, retention of food pabulum and recurrence of decay? Who did that? Why it was the most elusive fellow in the world, commonly called "the other fellow."

Every conscientious operator, as his ideals and technique improve, sees some of his own work which he would like to do over again, that it might be made better, and for him I have no criticism. But I do criticise the man whose work is no better today than it was ten or five or even two years ago.

What is true of fillings and inlays is true also of every other branch of our work. Ill-fitting crowns and bands are made and inserted by the pound. Unscientific, dirt collecting and disease producing bridgework is still made and inserted by the ton. Crowns and fillings are still placed over root canals in dead teeth where no proper effort has been made to do thorough work.

Patients come into your offices every week with blind abscesses which are never even looked for, and fistulas which are never even found, or worse yet, they are discovered and not eliminated. More than half of all the devitalized lower first molars which I find, have no filling at all in the mesio-buccal canal and a large percentage of these show infections. A fine commentary on the intelligence of our profession. One might think that half the dentists didn't know there is such a thing as a mesio-buccal canal. A large percentage also of all the attempted root fillings I find are far short of the apex. Do you mean to tell me that the men who do these things don't know any better? I don't believe it.

As a result of the post graduate work in the sections of the First District Dental Society of the State of New York, most of the men have improved their equipment.

In the root canal section, nearly, if not quite every man has installed an X-ray outfit and many have also purchased apparatus for ionization treatment. No man who is filling root canals without the help of radiographs is doing himself or his patients justice. If you think that you are, just send the next half dozen patients for whom you fill root canals and have them radiographed (at your own expense if necessary) and see how many of them are filled to the apex and then just digest the thought that you are leaving a menace in every case where your filling comes short of the apex.

Is that the way you would want them in your own mouth? I doubt it. But in any case you have no right to leave them so in your patients' mouths. What shall you do? Why take them out, enlarge the canals, and fill them over again and then make another radiograph to make sure they are right.

If you have never done this I am sure you will find it a good investment. You will learn something about your own work which you never knew before, and should profit by it.

The time has come when the medical profession, through the work done by some of the more advanced men in the dental profession, have been aroused to the necessity for careful and scientific work in the mouths of their patients.

Every man here knows that we frequently work upon mouths in which there are diseased conditions, and yet let me ask what is done with the instruments after operating on such mouths. Only the merest pretense of sterilization is made. The instruments are probably washed with soap and water and perhaps passed through some further program of inefficient sterilization, such as dipping into alcohol for a few seconds or enclosing them in the average formalin sterilizer, or even putting them for a moment or two into the average steam sterilizer. The lack of efficiency in sterilizing in the average dental office is not due primarily to any desire to be negligent in this matter, but is due, rather, to a gross ignorance on the part of the profession as to what constitutes efficient sterilization. If you think that your present methods are efficient send some of your instruments to a bacteriologist after they have been passed through your usual form of sterilization and see what he finds—the results may be

interesting. It is time that the profession learns something more about sterilization and improves its technique thereon.

To what extent are aseptic precautions followed when opening into a dental pulp? This is really a surgical operation and should receive the same surgical care that would be observed by a careful surgeon if he were cutting into a finger or some other portion of your anatomy, but this is not done. In the first place the field is rarely sterilized, and in many cases even the rubber dam is not used. Then in opening the cavities, stones and burs are used, which have been used in other mouths and not perfectly sterilized. I have even seen supposedly careful operators ask their assistant for a new bur and take the liberty of assuming because it was new it was sterile. The most eminent men, in both professions, are collaborating with the best bacteriologists in proving that many systemic diseases have their origin in infections in the mouth and around the roots of diseased teeth.

This work has just begun and will surely grow and develop. The family physician will ask you for a diagnosis of the pathological conditions in his patients' mouths. Are you prepared to give it? Are you prepared intelligently to discuss the case with him? Do you know how to make a culture? Do you even know how to take a smear for a culture?

The self-respecting dentist will prepare himself to meet this occasion, but what will happen to the other fellow? Are you "the other fellow?" If you are, for the love of your self-respect wake up! If you are the other fellow for the love of your fellowmen wake up. If you are the other fellow, for your own sake wake up!

For just as surely as you neglect to put yourself right in these matters just so surely will they come home to roost to your personal discomfort, chagrin and loss.

Through the efforts of the best men in our profession, the medical men are being taught to demand those things. Are you going to wait until they are forced upon you? Ten thousand times No!

What then are you going to do about it?

A few years ago I made a plea for comprehensive dentistry, and I have repeated it many times and I repeat it now.

The first thing to do is to bring your equipment up to a point

of efficiency. This, in my opinion, should mean not only that our surroundings should be clean, but that we should have clean, sharp, absolutely sterile instruments; clean, sterile towels and napkins, an X-ray outfit and some method of minimizing pain, and last but not least—clean hands, for I have seen too many dentists operating with hands that I should hate to have put into my mouth.

Now what do I mean by comprehensive dentistry? I mean that when a patient presents, complaining of a pain in a R. U. first molar, you have no right to fill a possible cavity in that tooth and dismiss your patient and suppose that you have done your whole duty, even though you may have inserted a good filling. If you went to a physician and complained of a pain in your side, would he just give you something to stop the pain? No, if he is a careful man, he would first hear what you had to say and then proceed to make a comprehensive diagnosis. He would thereby increase the value of his services to you and also increase your respect for him.

A comprehensive examination of the mouth should include a careful search for cavities, for faulty fillings, crowns or bridges, for non-vital teeth, for faulty root canal fillings, for fistulas, for blind abscesses, for impacted teeth, for pyorrhoea and faulty occlusion.

Where more or less extensive restorations are to be made, full upper and lower impressions should also be taken and models made. These models should be carefully studied in conjunction with radiographs of any diseased areas and a reasonably definite plan of campaign should be mapped out before doing any work in the patient's mouth. The general outline of this plan should be submitted to your patient, and he should be given to understand that you expect to take charge of his mouth and do for him whatever is necessary, and in nine cases out of ten, you will find that the patient is so interested and impressed by your thoroughness in diagnosis that he will be willing to submit himself to whatever you may prescribe as necessary. If you are not following these or similar steps in diagnosis, then you are not working in this regard to the limit of your present ability. You can be a better dentist right away by adopting this tech-

nique, also I predict that the results will be so satisfactory, both to you and your patients, that you will never again lapse into the old methods of slip-shod diagnosis.

The preparation of cavities or inlays is another step wherein I feel satisfied that a large percentage of the men can improve their work.

I wonder how many dentists, after preparing a cavity in a manner which seems to them satisfactory, take the trouble to look at the cavity through a magnifying glass. There is a glass made for the use of jewelers which is called a loupe and which I would recommend everybody to buy. It costs four or five dollars and the use of it will help any conscientious man to improve his technique.

If after preparing a cavity by your usual technique, you will look at it with a strong magnifying glass you will probably find that the margins of the cavity are not so smooth as you had supposed they were. You will also find possibly that there is some slight undercut and a correction of either or both of these conditions will undoubtedly improve your results. Such a glass will be found advantageous too when trimming the dies and also when trimming the inlays in the dies when following the indirect method. The carving and contouring of amalgam fillings and also the polishing of amalgam fillings, is a point where I know a large percentage of men fail to reach the limit of their present ability.

Then, too, the average gold shell crown comes far from properly fitting the tooth on which it is placed. This is due largely to the fact that the operator does not take sufficient time properly to prepare, cut down and trim the tooth for which the crown is intended, and if this first step is not properly done, then it is a physical impossibility to get even a fair fit. If this is the kind of crown you are making, then you are doing so because you are not working up to the limit of your present ability. It is not that the operator does not know better, but that he comes short of doing as good a piece of work as he is capable of doing.

If it is true that you are working up to the best of your present ability, then you can be a better dentist by increasing the limit of your ability, but this cannot be done without some sac-

rifice of time, any more than any other good thing can be accomplished without proper effort. Post Graduate work is just as essential to the average practitioner, if he would grow, as are moisture and sunshine to seeds. I believe that it is desirable that every good dentist should take one or more dental magazines and read them and adopt such suggestions for new methods as may seem to be an improvement over his present methods. Post graduate classes for instruction have been formed in many of the larger cities, most of these under the auspices of the local society. Last year at our First District Society of New York, there were 125 men enrolled for post-graduate work with an average attendance of 95 per cent. all through the winter. Our classes included Orthodontia work, Prosthetic work, Crown, Bridge and Inlay work, Root Canal work, Oral Surgery, and next winter we intend to add a class in Bacteriology.

When I tell you that each section met twice a month and that many of the men attended two or three sections, and one or two attended all five sections, you will understand something of the earnestness of these men to increase their knowledge and improve the quality of their work.

I know that it is not always possible to run a series of classes in a comparatively small community, but in many cases, a man who is anxious to improve in one particular line, can readily find a sufficient number of others who will join him, so that they can start a class of their own, and with some expenditure of time and a small amount of money, could secure instructors. One thing, at least they could do, they could put their pride in their pockets and go to the man in their immediate neighborhood, whom they know excels them in this particular subject; frankly acknowledge their deficiency and ask him to take charge of a small class and teach them what he knows of that technique. This will accomplish a triple purpose. It will help you to improve your own work; it will stimulate to better efforts the man who is teaching you and will bring about a harmonious and get-together feeling in the neighborhood, and increase the feeling of good fellowship and mutual respect. Everybody respects a man who is honestly striving to learn, even though his present accomplishments may be below par.

In order to do his best work one must have enthusiasm, inspiration and imagination. The getting together of a few men united in one earnest purpose will foster the enthusiasm and inspiration, and one's own efforts to do better work will stimulate the imagination, for if a man would do some one thing with a better result than he has ever attained before, he must have in mind a mental picture of that which he is striving to achieve, and the higher the vision soars, the greater will be the achievement, and the higher one climbs the broader will be the vision.

THE AMERICAN AMBULANCE

NEUILLY-SUR-SEINE (PARIS)

Statement of Mrs. Robert Bacon, Chairman of the American Committee to the American Red Cross at its Annual Meeting in Washington, December 8, 1915.

In a brief review of the work of the American Ambulance Hospital in Paris during the past year, in connection with the general war relief work done in Europe by Americans, it is not necessary to dwell at any length upon its inception or inspiration. It is enough, perhaps, to say that Americans who were in France at the beginning of the war, either as residents or as visitors, organized this hospital as an effective means of relieving distress, and expressing, in a practical way, the gratitude which this country must always feel toward France for her help at the most critical stage of our history.

There existed a small but remarkably complete and excellent American hospital at Neuilly, a suburb of Paris, and the organization of this hospital was made the basis for the organization of what is known as the American Ambulance, the term Ambulance in French signifying a military hospital.

As soon as the intentions of these Americans were made known, the French Government, through its Minister of War, expressed its appreciation, and placed at the disposal of the American hospital a large and nearly finished school building in Neuilly. In a little less than two weeks this big building, in which at the time there were neither doors nor windows, was transformed, under the supervision of an American architect, acting in conjunction with American surgeons, into a modern hospital, completely equipped with the latest appliances, fitted with X-ray machines, ultra-violet ray filtering apparatus, a dental department, operating rooms, linen and bandage rooms, diet kitchens, and all the other requirements of present-day surgical science.

The first wounded entered the hospital on September 7, 1914, and ever since then there has been a constantly increasing demand upon the hospital, until now there are about 600 patients, the exact number varying, of course, from day to day.

For military reasons the call upon the hospitals in Paris has fluctuated. As long as the capital was threatened, it was the obvious policy to have as few wounded in Paris as possible, in order that they might not retard an enforced rapid evacuation, and, also, in order that the hospitals might be prepared to answer any sudden and large call upon their resources. In spite of this fact, the number of patients at the American Ambulance has always approached so closely its capacity that it has been necessary to add beds continually, until now the maximum, 612, has been reached.

Although the cases sent to the American Ambulance have been of the severest type, the death-rate, varying from month to month, has been for the past twelve months, four and sixty-two one hundredths per cent. (4.62%)—more than ninety-five out of every hundred who have entered the hospital have been saved—an eloquent tribute to the skill of American surgeons and American nurses.

Of the severe cases, many have been sent to the Ambulance because of its facilities to deal with facial wounds. This department, which was an innovation, has been able to restore frightfully disfigured men to something like their normal appearance. Through the patience and skill of experts in facial wounds, oral surgeons and dentists, men whose disfigurements would suffice to bar them from the society of their fellow-men, and make it impossible for them to earn a livelihood, men with faces, jaws and noses shot away, may return to their families and friends and resume their old occupations. There are more than 100 such cases now at the Ambulance. These cases require long treatment, but the results, new to war-time surgery, have called forth the highest praise. I was at the Ambulance myself last summer, and saw many such cases, but it is difficult to convey an adequate idea of the wonders that are being performed.

Photographic records of these cases are carefully kept. There are complete surgical and medical histories of all the cases at the Ambulance, with X-ray photographs attached. This is the first time that such records have been kept in a military hospital in time of war, and the great benefit which science will derive is regarded by professional authorities as incalculable.

The staff of the American Ambulance is made up of surgeons, physicians, dentists, nurses, auxiliaries and helpers. The number of the staff varies slightly according to the needs, but the average proportions as compared to the number of patients has been approximately forty-five per cent., a small percentage when it is remembered that all of the auxiliaries serve without pay, and that there is an unusual need for their services, as the reconstructed building is extremely large, four stories high, and there are no lifts. These auxiliaries are recruited largely from among American women who live in Paris. Their devoted service has been the subject of repeated eulogy from the surgeons and physicians. These untrained helpers, who were totally unaccustomed to the hard, menial tasks they now render, have gone on, day after day, month after month, through summer and winter, rising in winter before dawn to be at their posts, reporting regularly at eight o'clock, staying on until six every evening; some of them on duty all night long, carrying out intelligently and faithfully the orders of surgeons and nurses, answering the calls of patients, winning the admiration of their professional superiors, and gaining the everlasting gratitude of the suffering men they serve. There are at present sixty-seven auxiliary nurses, some of whom have served since the beginning of the war. They are allowed one-half day of liberty each week.

As an instance of the adaptability and capability shown by these volunteers, who serve without pay, and many of whom pay for the meals they eat at the hospital, it might be mentioned that the bandage department, which is under their charge, has been described by returning surgeons as the most complete and efficient bandage room known to their experience.

Of trained nurses, there are at present seventy-nine in the hospital, nearly all Americans or Canadians, recruited from the leading hospitals in this country, and of the highest standard of experience and efficiency. The self-sacrifice which marks the service of the auxiliaries is also a part of the service of the professional nurses. Although earning by their employment in this country \$100 or more a month, they work at the Ambulance for monthly salaries ranging from \$20 to \$50.

The American Ambulance is now organized into two ser-

vices, each of approximately 300 beds, one of which is under the charge of the surgeon-in-chief, Dr. George Winchester DuBouchet, and the other under the charge of the assistant surgeon, Dr. James P. Hutchinson, of Philadelphia. Under each of these surgeons are two assistants, and four house-officers, and there are, besides, two senior residents. Eminent surgeons from the United States serve at the hospital, with their staffs of nurses and surgeons, and this service, which has been known as the University division, has included units from the Western Reserve University, Harvard University and the University of Pennsylvania, respectively, under Dr. George W. Crile, Dr. Harvey Cushing, and Dr. J. William White and Dr. Hutchinson. The service is for three months. Dr. Hutchinson has remained at the hospital, and Dr. Crile and Dr. Cushing have expressed their intention to resume their services during the coming year.

There are two hospitals for semi-convalescent cases at St. Cloud, a suburb of Paris, which the physicians of the American Ambulance visit regularly, supervising the care of seventy patients who have left the Ambulance, but who are still in need of occasional surgical or medical attention.

Hospital "B" at Juilly, 25 miles closer to the battle-lines than Paris, can accommodate at present, with its annex for convalescents, about 200 cases. It is maintained through the generosity of Mrs. Harry Payne Whitney, and has been under the direction of Dr. Walton Martin, Dr. George E. Brewer, Dr. Drennen, and Dr. Lyle of New York City. Dr. Judd is the present surgeon in charge.

The portable field tent hospital, which was purchased from the United States Department of War, has been in operation at Pagny, until the recent cold weather has made tent hospitals impracticable. It is designed to meet a demand that will inevitably follow any advance of the troops into devastated territory, where all houses have been destroyed, and where there are no permanent buildings fit for hospital purposes. The tent hospital, which embraces 33 tents, including an operating tent, accommodates 108 patients. It is under the direction of the French military authorities, but has been served by an ambulance section of the American Ambulance.

The ambulances of the American Ambulance have transported about 90,000 wounded. The monthly average is about 10,000. Sections of from ten to twenty-four cars are stationed at various places at the front, and in Paris, and at Juilly. There are about 160 cars in the total service, of which about 110 are ambulances proper, the others being staff cars, supply cars, trucks, etc. Most of these cars have been donated by Americans. It costs about \$6,000 a month to maintain this service. All of the drivers are volunteers, and all, with four or five exceptions, are Americans. Most of them are college men. They have been mentioned individually, and by sections, in the official despatches, for their courage, devotion and efficiency, and nineteen of them have received the "*croix de guerre*," for carrying wounded under heavy shell fire.

At the time of the prolonged battles in the vicinity of Ypres in May, General Putz wrote that the American section had, by working five days and nights without interruption, assured the evacuation of the hospitals in Elverdinghe, though under continual shell fire, which covered all of the roads in the neighborhood, and even the hospitals themselves. By this means 3,000 wounded men were taken out of danger and removed to other hospitals, the Americans saving even the equipment.

"I cannot praise too highly," General Putz wrote to the Inspector, "the courage and devotion of which the men in your section have given evidence, and I ask you to transmit to them my congratulations and my thanks for the great physical effort which they have so generously made and the signal services which they have rendered."

When two young Americans on the eastern front—in Alsace, where the only motor ambulances are those belonging to the American section—received the coveted "*croix de guerre*," with the troops drawn up to salute them in recognition of their bravery, the commandant said:

"Gentlemen, under heavy artillery fire you carried to safety wounded who, without your calmness, bravery, and fine devotion to duty, would have perished miserably. In acknowledgment, the general is glad to confer upon you the '*croix de guerre*,' which the Republic created to be worn by the heroes as a sign of their

bravery. I am happy to have the duty of presenting you this cross, as it gives me opportunity to congratulate you heartily, and to thank you, and the whole section of the American Ambulance No. 3, for the admirable work you are doing."

The American Ambulance is maintained by voluntary contributions of Americans, who have borne the expense, amounting to nearly \$1,000 a day, for the maintenance of the hospital and the ambulance service. The contributions are sent to the Ambulance without the deduction of a single cent for expenses of administration, office rent, secretary or clerk hire, printing, postage or advertising, so that every cent of every dollar goes directly and entirely to the purpose for which it is contributed. The affairs of the Ambulance in France are administered by a committee of well-known American business men, nearly all of them residents of Paris, and the accounts are regularly audited by outside professional auditors.

It should be stated that the American Ambulance receives no subsidy from the French Government. The entire expense is borne by Americans.

Up to September 1, 1915, practically a year of service, the net running expenses at the Ambulance in Neuilly amounted to 1,427,428.10 francs, which, at the average rate of exchange, is the equivalent of, approximately, \$242,662. This does not include the cost of original installation, nor the cost of the field ambulance service. The average daily expense for each patient has varied with the months, according to cost of supplies in Paris, which has steadily risen, and the amount spent in enlarging the capacity of the hospital. During March, April and May of this year the average cost per patient was 6.82 francs or about \$1.15. During July, August and September the cost was 8.52 francs or about \$1.43. The approximate average daily cost per patient is 7.50 francs or about \$1.28. The average daily cost per patient in Bellevue Hospital, where the cost is the lowest of any of the New York City hospitals, is \$1.86. It is much more expensive to conduct a surgical hospital than a general hospital, and, of course, the cost in a country at war is more than in a country at peace. The very low cost at the American Ambulance is made possible by the fact that the surgeons, phy-

sicians, dentists and auxiliaries give their services without pay.

The American Ambulance is building up what its supporters believe will be an everlasting monument in France to this country. The immediate work of saving lives and relieving suffering by American skill is enhanced by the international service that is being rendered in winning for the United States the gratitude, friendship and loyalty of a people to whom we owe much.

With the need of the American Ambulance clearly demonstrated and constantly growing; its organization established and its work systematized; with the increasing number of relief organizations and the greater difficulty to interest the contributing public in new and various appeals, the suggestion prompts itself that, in the existing organization of the American Ambulance, an opportunity may be found for cooperation, and for a coordination of the noble effort that is being made in this country to bring to Europe relief in its most practical and enduring form.

RESTORATIONS *VERSUS* FILLINGS WITH SPECIAL REFERENCES TO AMALGAM¹

BY WILLIAM R. POND, D.D.S., RUTLAND, VT.

In the study of normal occlusion one cannot fail to realize the wonderfully efficient masticatory apparatus which nature has developed, nor is it a far cry for the logical mind to grasp the fact that the nearer we come to producing this desirable result by orthodontic treatment and by restorations, the nearer we are to attaining our ideal. In order to create or construct, one must have an ideal in mind, and the general practitioner of dentistry can as profitably use the ideal of normal occlusion as can the orthodontist. More than that, he must go farther back than occlusion as a whole and study the units which go to make up this occlusion. He must study dental anatomy and if he would restore the normal function and beauty of a tooth by a filling, he must have a thorough understanding of the form and detail of each tooth which goes to make up the dental apparatus. It must be distinctly borne in mind that "the office of a filling is to restore the form and physiological function of the tooth." When this idea is carried out we have truly made a *restoration* and not merely a filling. To one who has this ideal in mind, an understanding of tooth forms and of occlusion is an obvious necessity. I may also add that a general practitioner of dentistry who thoroughly understands occlusion will not be satisfied with anything short of a restoration of lost tooth structure.

In studying dental anatomy one cannot fail to be impressed with the wonderful tooth forms nature has developed; each plane, each groove and sulcus so perfect in its detail, and so efficiently arranged for practical use. How much is lost in efficiency and beauty when we fail to reproduce these natural tooth forms! How much the flat polished occlusal surfaces of most of our fillings lack. Not only do they lack in efficiency as grinders and from an esthetic point of view, but how sadly

¹ Read at the Fifty-first Annual Meeting of the Massachusetts Dental Society, May 5, 6, 7, Boston, Mass.

they fail in giving the natural protection to the surrounding soft tissues and particularly to the interdental spaces. The study of conditions arising from faulty fillings, fillings which do not restore and which do not protect from lack of proper proximal contact, leads to an endless chain of thought regarding the possibilities of evil results. In the young, lack of proper bone growth and development may come from insufficient use of the teeth, and at all ages the lack of proper mastication not only leads to digestive disorders but has a large bearing on the problem of caries. With a proper masticating apparatus and a proper diet, caries susceptibility will be reduced to a minimum. Then too we must not overlook the fact that in a mouth having an inefficient masticatory apparatus caused by ineffective and faulty fillings there is bound to be an unhealthy condition of the gums due to irritation and lack of proper stimulation. In these cases there is poor resistance against infection, improper conditions for self-cleansing and for natural protection, and much pyorrhea.

So far let us agree with what is so clearly right regarding the necessity of restoring tooth forms, and so far as possible, normal occlusion in our filling work. Is it necessary, however, to resort to the cast gold inlay, as has been stated by most writers on the subject, in order to attain this desired result? There is no denying the results which can be obtained in reproducing correct detail of tooth forms by the cast inlay, and unless we can get the same results with other filling materials we should certainly not be justified in using other methods for the bulk of our occlusal restorations. One of my principal aims this evening is to show that amalgam can be carved to reproduce as accurate and as artistic results as can be accomplished with the cast gold inlay. I trust my lantern slides and clinic material will prove this point to your satisfaction.

It has been said that 75 per cent. of our fillings are made with amalgam and I believe this statement is approximately correct. Why then should we spend all our time in developing a correct technique for the remaining 25 per cent. of our work? Surely something should be done toward obtaining more nearly ideal results with amalgam. Amalgam as a filling material has

many ideal qualities. It is bound to be used and it should be used. It is the most used and also the most abused of our filling materials. Much of the amalgam work done is a disgrace to the profession, and it is high time this "skeleton in the closet" should be given a thorough airing. Let us then raise the standard of this class of work until we can be as justly proud of our amalgam work as we are of our inlays and malleted gold fillings.

Dr. Black says "The idea that amalgam is a cheap filling to be done quickly in any old way, should be discarded forever. The dentist should have the same pay for time in making amalgam fillings as in making gold fillings, and should take the time to do it well." I should like to add to this an appeal for a better understanding of the material itself and for a more standardized technique for its use. As I have written elsewhere on the technique of amalgam operations, I do not care to go into detail on this part of the subject. I should like, however, to speak briefly of a few fundamental principles in order to explain my points.

Cavity preparation should be just as thorough as for gold work. All amalgam fillings should be cemented in by a lining of soft cement, into which is packed the first layer of the filling material. If this system is carried out, little or no undercut is necessary. A typical inlay preparation with flat seat will hold an amalgam filling provided it is cemented in. Proper proximal contact is absolutely necessary and is a weak point with most of our amalgam fillings. Correct tooth forms can and must be restored with particular reference to the minute detail of grooves and sulci and above all to the restoration of the marginal ridges. The carving of grooves and sulci must be done with fine sharp instruments and not with spoon excavators as has been advocated by some. Round bottomed sulci are neither correct nor efficient. Proper articulation must be secured with allowance for movements of the mandible. Last but not least, the filling must be carefully finished and polished.

Finally, there can be no argument against the fact that the nearer we come to restoring lost tooth structure to its original normal form, the greater efficiency are we producing and the more are we contributing to the good health and comfort of our

patients. No discriminating operator can exclude amalgam from his practice, for its possibilities in restoring the efficiency of bicuspid and molar teeth are practically unlimited.

REPORTS OF SOCIETY MEETINGS

FIRST DISTRICT DENTAL SOCIETY OF THE STATE
OF NEW YORK

October 4, 1915

A regular meeting of the First District Dental Society of the State of New York, was held on Monday evening, Oct. 4th, 1915, at the Academy of Medicine, No. 17 West Forty-third Street, New York City.

In the absence of the President, Dr. W. D. Tracy, who was unable to be present owing to the sudden death of his father, the Vice-President, Dr. W. B. Dunning, occupied the chair and called the meeting to order.

The Chairman—Ladies and Gentleman, before proceeding with the regular program of the evening, I have the honor to introduce to you a gentleman who has come to us from Paris, to speak in behalf of the foundation of a special hospital in Paris for treatment of wounds about the face and jaws. Dr. Anema comes accredited by French officials and by our Ambassador, and he will tell us of the dreadful conditions which we know exist in Europe at the present time, and of the great frequency of wounds about the face.

Dr. R. Anema, of Paris, explained the necessity for the creation of a special hospital in Paris for the treatment of wounds of the face and jaws. It is true, he said, that excellent treatment is given in the dental clinics attached to different hospitals in France, but wounds of the face and jaws are so numerous that a hospital specially equipped for these cases is a crying need. On the 5th of May, according to official statistics, there were among Belgian and French soldiers alone, 55,570 facial wounds. This did not include the number of wounded in the Dardanelles. He felt honored to bring this message before the society, and hoped that the Association called the Special American Hospital for Wounds of the Face and Jaws, which had just been founded in Paris, might count on the benevolent co-

operation of the First District Dental Society of New York. He then read an appeal of the Association for the Special American Hospital in Paris, of which he is the secretary, and showed several slides of face and jaw wounds operated upon by Prof. Morestin, restorations having been made by bone and skin grafting. In one case a part of the rib of the patient was taken and put in place where bone substance in the jaw region had been lost. From other parts of the body a piece of skin was taken to make up for the destruction of the skin.

Here follows the appeal as it was read:

URGENT APPEAL

FOR THE

FOUNDATION OF A SPECIAL AMERICAN HOSPITAL

AT PARIS

“FOR WOUNDS OF THE FACE AND JAWS”

The terrible ravages caused by wounds in the face and jaws, in the present war, bring to the fore problems of orthodontic and surgical art. General hospitals at the outset showed but little interest in a service directed towards such a special branch of surgery and have hesitated to ask the co-operation of conscientious practitioners. After twelve months of war, the result is that there are throughout Europe 6,490,000 wounded (official statistics issued by the War Minister on May 5th, 1915), and this figure is not in proportion with existing medical organizations, not because an urgent appeal has not been made or that all scientific resources have not been brought to bear, but because the nature and number of the wounds have upset all calculations.

Here is a striking example of this deficiency: a director of a general hospital declared to one of his colleagues that it had been decided on principle not to treat any facial wounds in his hospital. This decision may be explained on the ground that no specialist could ever have foreseen such a development of his art.

The initiative taken by the American Institute of Dental Teachers in creating a fund of which the proceeds should be sent to the Dental Hospitals of the Red Cross for starting a special

service for soldiers wounded in the face, show the admirable and practical sympathy of the United States.

At the present time no special Dental Hospital exists in Europe, and this is a deficiency which, with your help, we should like to make up.

It is true that some clinics exist for maxillary and facial wounds and are attached to various hospitals, but there is no special hospital devoted to them.

On the 5th of May there were amongst the French and Belgian wounded, 55,770 face wounds.* Trench warfare is responsible for this considerable number and the clinics to receive them are relatively few. One clinic had, on the 24th of May, 193 patients and this is about the largest number that any of them can take. It can be seen then, how pressing is the need to create a vast hospital for this object.

We have asked a surgeon, known for his skill in restorative surgery, to help us, and he has consented. We refer to Dr. Morestin, a Member of the Faculty of Medicine of Paris and hospital surgeon. He is at the head of the service of the Val de Grace hospital and performs operations at Rothschild's Hospital; both his wards are more than full now. According to this surgeon's opinion 200 beds would be occupied in less than a week by cases of maxillary fractures. Therefore, a hospital of 500 beds at least will be necessary. The greater part of Professor Morestein's time is devoted to "cleaning" operations. He cleans the faces and jaws of his patients by removing from them shrapnel bullets, pieces of bombs, etc., in order to reduce fever and infection. The question of restoration, mecano-therapeutic as well as facio-surgical can only be, for the greater part, examined after the war on account of the considerable number of cases concerned.

It is not necessary to point out how much better results would be obtained by immediate treatment. It appears then, and we repeat with this eminent surgeon, that inestimable services

(*) Number of wounded French and Belgian soldiers, 715,000 (War Office, May 5, 1915), 13% of which, according to a report in the Paris Academy of Medicine, are head wounds, that is 92,950. 60% of this number, according to moderate calculations, are face and jaw wounds, that is 55,570. To this should be added the number of Germans wounded in the facial region, prisoners in France, and English wounded of the same category as far as they are not sent to England.

would be rendered by the foundation of a hospital for wounds in the facial and jaw regions.

It is therefore important that we make every effort to arrive at this result. We can say that we have received every moral encouragement, and we have realized still more the need for the hospital by seeing the benevolent attitude of the authorities. The War Minister received the members of the committee in audience. The use of a building was offered us and mechanics were guaranteed who would be indispensable to our laboratory work. We were promised that they should be brought back from the front for our purpose.

We have been received in special audience also by the American Ambassador in Paris, who expressed by letter his favorable encouragement.

Now, besides this moral encouragement, financial aid is necessary. Professional men are not rich. They can and will give their services and knowledge without any remuneration. We make appeal then to well-wishers on the other side of the ocean who would like to co-operate in this great humane work for poor mutilated Europeans.

A financial committee consisting exclusively of business men has been formed to be in accordance with French law regarding philanthropic institutions. Twenty thousand dollars are necessary to start a hospital of 100 beds and run it for six months.

We desire that this hospital be worthy of American prestige and American dental surgery and we have the intention of asking colleagues in America to come over and help us. Our urgent appeal now is this: "Surgeons, Surgeon-Dentists, Orthodontists and you, all American medical men interested in our hospital, present and plead our cause to your devoted patients so that they may give their mite towards the creation of this hospital." Both large and small donations will be greatly appreciated and can be sent to any member of our group or to Messrs. J. P. Morgan & Co., Bankers, Wall Street, New York; Messrs. Morgan, Harjes & Co., Bankers, 31 Boulevard Haussmann, Paris, or to our Treasurer, Mr. Ch. van Enter, 21 rue du Dragon, Paris.

The names of the donors and practitioners will be published, and they will receive a receipt engraved by a French artist as a souvenir of their humanitarian gift.

All contributions should be addressed: "For the Special American Hospital at Paris for Wounds of the Face and Jaws." Paris, August, 1915.

Members of our group,

WM. J. YOUNGER, M. D.

J. H. SPAULDING, D. D. S.

I. B. DAVENPORT, M. D., M. D. S.

H. MORESTIN, M. D.

J. L. ANDRÉ BONNET, Ch. D.

F. J. WILSON, D. D. S.

FRANK W. WILLIAMS, D. D. S.

R. ANEMA, D. D. S.

The Chairman—We are indebted to Dr. Anema for presenting the subject in such a graphic and impressive—although we might almost say oppressive—way. The need is so overwhelming, that I am at a loss as to what this Society should do; but it demands our earnest and sympathetic attention. It appeals to our patriotism, as professional men, in some way to help this dreadful situation on the other side of the water by any ways or means within our power.

The paper of the evening was then read by Dr. Morris I. Schamberg entitled: "Dentistry, a Blessing and a Curse."¹

Dr. Schamberg—Mr. President, and members of the First District Dental Society:—It was highly fitting that my paper should have received the introduction that it did, in the presentation of conditions as they exist on the other side to-day; because it sets our minds in a receptive condition to realize that that which can be prevented is far better than that which must be cured; and the prevention of these ghastly conditions in Europe would be far better than the expenditure of these large sums of money and energy toward the cure after the damage has been done.

My paper leans somewhat in the same direction, because I believe that far more can be done to prevent the troubles that I am going to portray; and though they may not be as ghastly as

¹ See Dr. Schamberg's paper in full at p. 418, this issue of THE JOURNAL.

some of the pictures shown by Dr. Anema, they are every bit as serious, and just as deadly, if not more so.

Discussion of Dr. Schamberg's Paper.

Dr. Arthur F. Chace—I wish to thank the Society for the opportunity of listening to this most interesting paper. It is of interest to review briefly the change in our conception of oral sepsis in the last five or six years. From the medical standpoint, up to about six years ago, the condition of the mouth as influencing health was confined largely to the dangers from swallowing pus, which even though it were swallowed, would be properly looked after by the hydrochloric acid of the gastric juice, and the opinion prevailed that the teeth should be in good condition for the proper mastication of food.

We little thought of the vast importance to which this subject would grow. As it has been in our state and city government, that the invisible corruption caused the trouble in our body politic, so it is with oral sepsis. It is the invisible pus hidden away, and the organisms that are constantly multiplying, that do the damage, not the open pus.

Now let us consider the present conception. We have, hidden away at the root of the tooth, a group of streptococci which propagate and form a toxin which is absorbed and carried by the lymph or blood streams to the different parts of the body. Having special affinities for certain tissues they attack various structures. The same organisms with perhaps a slight difference in culture growth, attack the muscles, nerves or endothelial lining of organs. Bacteria can still further be influenced to attack definite organs. There are definite cultural conditions which can be simulated in the laboratory, and by this means distinct lesions can be produced throughout the body.

Rosenow has shown the possibility of transmutation of bacteria.

Aside from the definite effect of the absorption of these toxins, other diseases can be produced by the absorption of the pus itself, producing various conditions of pyemia.

The organism can produce substances which will dissolve the red blood cells and produce anemias, and in some vague way some of the leucemias. So our conception of oral sepsis has com-

pletely changed, and we are not so much worried about the pus which is seen, but we are finding out, thanks to the X-ray and the advance in bacteriology, that the pus which is present but is not seen is causing the damage.

I might mention a few of the mistakes we have met with in treating constitutional diseases on the basis of local infections of the mouth. The first mistake I encountered was this: A patient came with signs of rheumatism. I asked him to consult his dentist, which he did, and a tooth being suspected, it was removed under antiseptic precaution, and the patient was given a vaccine, but he did not improve. I was discredited and the dentist was discredited, but that sometimes happens. I thought the matter over during the Summer and in the Fall, I said I was not completely satisfied that the foci had been completely removed. We found there were other teeth involved, which should have been removed. That was done, and the patient treated with vaccine of streptococcus viridens, and an improvement took place. Never try to give vaccine until the last focus has been removed.

Do not try to cure the focus on the root by giving vaccine.

The dentist said to me, "I want to save the tooth. Don't you think you can give the vaccine and it will cure the rheumatism and cure the trouble at that point, and yet save the tooth?"

No matter how slight the trouble, do not depend on the vaccine to cure the foci.

The second mistake was made with a patient who came with very marked deformity. A tooth was extracted, and all the foci eradicated, and the patient improved in general health, but the joint condition did not improve. When the organism has reached a joint, giving the vaccine does not cure it. If you have a secondary foci in the joint, it is too late. You can help the patient's health, but you cannot repair the damage which has been done. Patients with very marked deformity come in, and expect you to cure it. You can stop the progress of the disease, but you cannot cure what has already taken place.

Rather than submit the patient to the annoyance of having an autogenous vaccine, it is sometimes said, "Why not give a

stock vaccine?" You also hear sometimes, "I do not know whether this is a staphylococcus infection, or a streptococcus, or a pneumococcus. Why not give a mixture of all of them and be sure to hit the right one?" That is going back to the old shotgun style of medicine, when the doctor give eighteen different kinds, hoping that one of them would do good and the other seventeen would do no harm.

By giving a mixed vaccine into the blood there is no opportunity for eliminating the toxins that do not do good, as with the old shotgun style of medicine, and it does do great harm.

A patient came in and said her dentist told her to get emetin hypodermically to relieve the condition. I might say many of the methods of modern treatment have been discredited because of using a remedy in all conditions, where it does not apply.

I would not use emetin unless the amebae were found in the mouth. It always pays in the long run to make a definite diagnosis before beginning the treatment, and then to use the autogenous vaccine and not the stock. I cannot overestimate the value of accurate diagnosis and autogenous treatment.

I am constantly impressed with the importance of early treatment. Ninety per cent. of the cases of rheumatism come for treatment too late. Ninety per cent. could have been avoided if they had had treatment earlier—if the oral surgeon had not taken chances by leaving a septic place in the mouth, because it had up to that time done no harm. The man goes around with crippled knees, or hands, afterwards although the progress of the disease may be checked.

A certain other heresy has been allowed to gain ground, and that is, that the recession of gums is due to uric acid. We have been interested in testing the blood chemically for uric acid in cases of recession of the gum during the last year or so. We have not found a single case. We do not know definitely the cause of recession of the gum. I am of the opinion it is due to some infective process, but it is not due to the excess of uric acid in the blood.

Dr. Schamberg said we must not allow the pendulum to swing too far. We find right in New York patients being treated for local disease of the mouth when in reality they are suffer-

ing from constitutional disease such as scurvy or one of the blood diseases.

Dr. Henry W. Gillett—It is a matter of history that before the establishment of the first school for the teaching of dentistry, its founders sought university and medical school association, and that their request met with flat refusal and the statement that "the subject of dentistry was of little consequence."

The antagonisms, bred by that early experience, influenced for years, and still influences, the course of dental education. If the medical faculty, whose decision was thus responsible for the founding of the first dental school as an independent private institution, had been endowed with the ability to project their personalities on through the decades to the present time, their decision would have been different. They would have heard the most eminent of their successors insisting on the paramount importance of clean, healthy, efficient mouths in insuring health of the individual.

Hunter's indictment of septic dentistry came none too soon, nor was it too severe. Out of it grew a vast amount of explanation on our part that failed to explain. We called loudly for more co-operation by medical men, we pointed out their neglect of the mouth and cited in triumph our fixed bridge work cases that had been successful in spite of their defects, and we laid it all on the other fellow.

Fortunately we did something more. Here and there among us men began scrutinizing methods, processes and results. Observation, comparison, consultation with general practitioners bore fruit.

More and more men are realizing that only after careful diagnosis of all the conditions of a given mouth, and consideration of its relation to the rest of the organism, may they safely attempt dental treatment. More and more dental practitioners are realizing that if they advise, assent to, permit, or fail to condemn the retention of septic foci in the mouth, they are morally responsible for the health and lives of their patients.

I dislike to contemplate what may be the legal responsibility of the practitioner who thus fails.

Lest I generalize too much, and so fail to make myself clear,

I will mention certain specific details of diagnosis and procedure. The universal experience of men who have used röntgenography in all their root canal work for even one month, is that they no longer dare do root canal work without its help. Blind dentistry means septic dentistry and responsibilities that no careful man will carry.

The twenty-five years' fight necessary to uproot the pernicious custom of extraction of sound teeth in orthodontic efforts naturally and necessarily carried us too far along the line of saving pathological teeth.

Only by idealizing and magnifying the value of the individual tooth could we have forced upon the extractor of first molars, a realization of his sacrilege, but that same process led to our focusing effort upon the unit instead of the organ, upon the organ instead of the organism.

We (particularly our pyorrhea specialists) need a broadening of vision to enable us to recognize the pathological significance of the tooth in advanced pyorrheal conditions, and a stiffening of determination to insist upon elimination of the doubtful elements.

Especially do we need better diagnosis in our daily work—earlier recognition of gingival lesions, and careful avoidance of many small causes of gingival irritation. We have recently been saddened by the loss from our ranks of the ablest scientist dentistry has ever known, Dr. Greene Vardiman Black. I am filled with gratitude that he was spared to complete his "*Special Dental Pathology*"² published last Spring. If every practitioner in this room would read, digest and apply the principles he enunciates, for the care and protection of gingivae, it would roll up such a record of achievement in preventive medicine as to be an unequalled monument of his life work.

My remark concerning fixed bridge work will arouse deep opposition in the minds of some of you. To those I make this challenge: Take the May, 1915, number of "*Items of Interest*" and study its articles on prophylaxis until you *think* you know what those writers mean by a clean healthy mouth, then go to

² G. V. Black, M. D., D. D. S., Sc. D., LL. D., *A Work on Special Dental Pathology*, 1915. Medico-Dental Pub. Co., Chicago. Claudius Ash Sons & Co., London.

one of them and let him show you just what he really *does* mean. Then observe, as they come to you, the mouths of your patients (your own and others) wearing fixed bridge work. When you have done this conscientiously for six months, or a year, I challenge you to report the percentage of cases where the gingival tissues, adjacent to fixed bridge work, in position one year or more, are in a satisfactory state of health. I greatly doubt if you will report one per cent. of such cases in those bridges supplying more than one tooth, with the possible exception of so-called "wash bridges."

The situation as to pulpless teeth at our hands is grave. I am in full accord with the essayist in his remarks on that score, and I want to emphasize what he touched lightly upon as to his personal relation to that branch of our work. I know enough of his practice to feel that he is telling the truth when he says 50 per cent. of his work as an oral surgeon is due to the faults and inefficiencies of the work of dental practitioners, and largely just the kind of inefficiencies he has had in mind when speaking of pulpless teeth. He is begging of us to wipe out that possibility—to adopt measures that shall be surely efficient.

How may this be done? Dr. Ottolengui's similar question in "Round the Table" has not been answered yet for the mass of practitioners. Some believe they have answered it for themselves by installing better diagnostic equipment, better aseptic technique, better mechanical technique, more efficient instrumental equipment and deeper study of details. This does not solve the problem for the patient of limited means. The final solution may not come till prophylaxis is generally and effectively practiced. I believe we shall some time have root canal specialists to assist the general practitioner, who finds himself weak in this line.

There is no question in my mind but that we need to be much more rigidly insistent on surgical eradication from the mouth of all pus and infection foci—even to the point of dismissing the patient who will not co-operate to this end. If you can't cure a pyorrheal tooth, first be sure it ought to be saved, and then send it to a specialist who believes he can do so. If he cannot, then remove the tooth. Likewise with the root end granuloma and

infection area—get it out of your patient's system, if you want to do him good rather than harm, and provide yourself with the means to diagnose its presence.

No general practitioner of dentistry, who has for any length of time pursued, with septic mouths, the plan of eliminating pathological foci, and then building up sanitary efficiency, needs convincing of the possibility of the extreme pictures Dr. Schamberg has drawn, as have other speakers from this platform in recent sessions. He has seen the earlier conditions fade away in the less advanced cases that have passed through his own hands, and become used to the report of less rheumatic trouble, better kidney action and less digestive disturbance following his efforts.

We must not overlook Dr. Schamberg's well made point as to the potential possibilities of the septic mouth in the so far healthy subject. A malignant infection from some other source may, in a week, pull that patient down to the point where it is easy to believe that the septic mouth condition may tip the scale between life and death.

It is no surprise to me to have Dr. Schamberg report a case of infection accompanying a root filling protruding beyond the apex, as advocated by Dr. Rhein. If he were to tell us that he was sure every step of the operation of placing it there has been conducted under rigid asepsis, then I should be surprised at such a report. It is to be regretted that many, who are skilled in mechanical technique, are unfortunate in their inability to realize the exacting details and constant alertness necessary to insure asepsis. Successful root canal work calls for exactness in all details—none can be neglected. Any man who is to-day doing his root canal work under a technique, which he would regard as insufficient for a laparotomy case, should re-adjust it until it will meet that test before he touches another such case.

I cannot pass the polyarthritic pyorrhea case shown on the screen without voicing my agreement with the essayist as to the great importance of relieving such a subject promptly, of all suspicious foci. I yield precedence to no one in my sense of appreciation of the value of a healthy and effective tooth, but

important as I believe efficient mastication to be in conserving good health, I should prefer, for such a subject, an artificial substitute to a suspicious organ.

The essayist's comment concerning the comfortable, but infected tooth should receive careful attention. Here again we find need for sure diagnosis, if we are to protect our patients and justify their reliance upon us. .

As you have seen, I am in accord with the essayist in the indictment he has drawn, and if our late member, Prof. Weisse, were present, he would take me to task for my pessimism, and tell us how dentistry has advanced, but I am not pessimistic either about our schools, or about our future progress.

A word about our schools—I believe few of their infirmaries and few of the dental infirmaries of hospitals, or other institutions, are to-day equipped and organized in a manner properly to safeguard the welfare of the patient needing root canal work. I agree that this condition has gone on altogether too long, and that not another dental student should be permitted to work on a root canal in the living subject until conditions have been set right, wherever they need modification.

Our schools are what they are by reason of the force of circumstances. In my first paragraph I recalled to you why the first one started independently. From that start have grown different varieties: the strong and well equipped, where able and earnest men have sacrificed enough to make them strong—the weak, where the ability or the earnestness of the sacrifice has been less. We have the university school, the school with medical association, and the independent school. They are doing what they may under existing circumstances, and the place to look for improvement is not to their corporate initiative, but to dental professional opinion—we, you and I, and all the rest of the organized part of the dental profession.

When united dental opinion says we disapprove not only of dental schools in which personal profit accrues, or may accrue, to individual stock ownership, then the stock college of that description will "put its house in order," and say publicly, as some do privately now, that "all profits go to our endowment fund to provide better education," and they will report openly all financial

details. When we say to them with unanimity and determination "You shall" and "You shall not" we will be heeded.

Just now there needs to be said—"You shall provide for teaching effective and sure asepsis in the handling of pulpless teeth," "You shall not permit septic root canal work on the living subject," and "You shall not continue to teach the insertion of artificial substitutes, which the subject cannot keep in sanitary condition."

I have used plain language concerning the need for re-adjustment of our standards at all points where septic conditions can possibly be a factor. I do so because I believe it is better for us to recognize and frankly admit this need, and apply from within our own ranks the pressure necessary to bring reluctant and lethargic practitioners into line, than to leave opportunity for the enforcement of that re-adjustment from the outside.

Unless we demonstrate our ability to meet such conditions as Dr. Schamberg has shown us, diagnosticians are going to apply their own remedy, and find relief from such cases in wholesale extraction, and by labeling all pulpless teeth as too dangerous to be tolerated.

I want no one to assume from this that I fail to realize how rapidly the more active men in this and many other centres are equipping themselves conclusively and effectually to handle these cases, and prevent the occurrence of such alarming conditions as have been shown to us. The number of men prepared to do this is rapidly increasing, but there are also many practitioners, who, as yet, show little, if any, interest in this vital matter.

I see no hope at the present time that it will be found practicable to make the possession of a medical degree compulsory for the dental graduate. I do hope the colleges, with the additional year they are about to require, will find it possible so to regulate their curriculum that no man can graduate without having had the chance to gain enough of medical principles to forbid his ever perpetrating such dentistry as we have seen illustrated here to-night.

We must remember, however, that most of the work shown us to-night was done before there was a recognized feasible way

of checking up the deeper conditions responsible for the secondary effects described, and before medical men had reached the point where they would sanction for their patients the more exacting technique demanded by our present comprehension of the situation. We must not, however, shield ourselves behind any failure of medical men in this connection. To point out weakness in their ranks in no sense helps us to a clean record. It is for us to show them, and the world, that in our chosen field we are competent both in reparative and preventive work. In the field of true preventive medicine lies our greatest opportunity.

To come back to the schools for a moment, I feel that they need, not less mechanics, but more medical knowledge to go with their mechanical instruction.

I am an optimist about our progress because I see men of all ages flocking to the standard of post-graduate instruction, classes filled before they can be announced, and places reserved months in advance. I see a growing demand for wider knowledge and higher achievement, not only from young men, but from men who have stood at the head of the line for years.

When I am most optimistic I see a vision, which I want to try to show you. I see a great dental hospital, with its wards and amphitheatres, with the leaders of the profession heading the departments, glad to give their services, because they may go into the amphitheatre, and do the best work of which they are capable, and so feel that it is worth while. I see the younger men pushing up, eager to show their professional skill and demonstrate their ability to step into their chiefs' places, and I see the same type of internes, and the same eager throng of students vying for a seat in the front row that we now see in the surgical amphitheatre. I see everywhere the same high standard of equipment and technique that we find to-day in our hospitals, but best of all I see one huge wing devoted to prophylaxis, serving steadily and constantly to reduce the need for those beautiful amphitheatres.

It is the inestimable privilege of the young men of this audience to work with the hope of seeing that vision realized, and of seeing the hour dawn when there shall be no question as to dentistry being a blessing.

Dr. Ward J. MacNeal—I wish first to express my appreciation of the opportunity to address you at this time. I shall speak very briefly about the technical procedures which are carried out in examining the roots of teeth, and pus from abscesses about the teeth which are sent from Dr. Schamberg's clinic.

The first problem which we have in mind is to get this material to the laboratory without deterioration of the essential elements. We have to trust to the operative skill of the surgeon to obtain exactly the material he wishes to have examined, and not to mix it with anything else. It is necessary to obtain the material from the end of the root or wherever the pus focus may be. We have it introduced immediately into a tube of ascitic fluid. This prevents the death of streptococci for instance, and it does not aid in the multiplication of organisms. Probably sending it up quickly in moist gauze would do as well; but there is sometimes delay and therefore we receive it in ascitic fluid, and it can be kept for twelve or even twenty-four hours if necessary. It is best, however, that the further work should proceed as quickly as possible.

The dilutions are made by transferring a considerable quantity of the ascitic fluid and pus to a tube containing about 3 c. c. of rabbit's blood. From this tube three platinum loops are carried to a second tube, and from this three loopfuls to a third. This is, of course, the method of dilution for plating as practised originally by Koch.

To the rabbit's blood we add about 7 to 8 c. c. of melted agar cooled to 50 degrees C. This is thoroughly mixed, and the mixture then poured into sterile Petri dishes. The material is allowed to stay there for from twenty-four to ninety-six hours, and inspected at daily intervals.

The use of the blood agar saves a great deal of time. If any of you have been making cultures from the mouth and not using blood, you are wasting a great deal of time. It enables you to distinguish at once and with considerable accuracy between the large colonies of mouth staphylococci to small colonies of hemolytic streptococci and the colonies of those organisms which do not cause a decided hemolysis, but do produce a definite greening of the blood agar. This peculiar feature—a

green discoloration—is of course associated with the term viridans, and is a feature of the group of mouth cocci with which the dentist seems to be particularly concerned.

It is frequently difficult to distinguish between a pneumococcus and a streptococcus viridans, except by further tests which will not be gone into here. One makes subcultures from the colonies to ascitic fluid agar. These cultures are then incubated for twenty-four hours, after which a report is made to the surgeon in charge, who tells us whether he wishes or does not wish to have a vaccine. From the pure cultures prepared from colonies on the blood agar plates, the vaccine is prepared in the ordinary way. (Wright's method.)

As a pathologist, I am very much interested in the results of this work. It seems to me the time is yet too early to decide whether these systemic disorders are, in a considerable percentage of cases, due to initial foci about the teeth and whether such foci may not exist about the teeth of individuals who never show secondary or tertiary manifestations, and do not have any systemic disturbances.

Nevertheless we should give careful attention to this work because here we have a possible explanation for many of these mysterious disorders which have been classed under the head of rheumatism arthritis and endocarditis, in which we know streptococci are concerned, and in which there is often infection at the roots of the teeth.

This is an extremely important advance, if it be true, and the hope that it may be true is so great in our minds that I think we should neglect nothing to forward this work; but it is a little bit early to come to a final decision about it.

Dr. Ottolengui—I should like to present a hypothetical question to the last speaker. I do so because he is the first one tonight who has voiced any doubt about the truth of these assertions—that because an arthritis is found to be associated with an abscess about the end of a root, and because streptococcus viridans is recovered therefrom, the arthritis is caused thereby.

Dr. Gillett—You left out one very important thing.

Dr. Ottolengui—Dr. Chace admitted that it is often hopeless to attempt to cure the arthritis. Consequently what we hear about

these cases clearing up has had some doubt cast upon it by the last speaker. It seems to me all of these histories lack the true beginning. Let us recapitulate. We know by these pictures that some dentist has failed to fill a tooth to the end of the root. I take it for granted that some of those teeth may have been in a state of health at the time of the original operation.

Now then, the hypothetical question is this: Suppose a dentist removes a pulp from a tooth, and inefficiently fills the root canal, and then attaches any kind of a superstructure on you please.

The second picture—after a lapse of a number of years, an arthritis or some other systemic disturbance is discovered, and coincidentally the röntgenogram shows an abscess at the end of the root. The tooth is extracted, and streptococcus viridans is recovered.

Question: What proof is there that streptococcus viridans attacked the root first, and thence traveled towards the other lesion?

Secondly: If so, how did streptococcus viridans get there?

I know I expose my ignorance, and I know I am not very bacteriological; but I am logical, and in all these bacteriological claims I note that the logical has been absent. Now let us have a little logic.

Dr. J. MacNeal—I should like to answer the second question first, and that is, the consideration of the evidence which would indicate the source of the streptococcus viridans. I perhaps should have mentioned that streptococcus viridans was first described under the name of streptococcus salivarius. It is a normal inhabitant of the mouth of us all, just as the bacillus coli is present in all of us. It is not the presence of a streptococcus in your body that will cause rheumatism or arthritis or anything of that kind. It is transmitted from husband to wife, or mother to child, in a perfectly natural manner. As long as the bacillus coli stays in the intestines it is perfectly harmless, and as long as the streptococcus viridans stays in the mouth it is harmless; but as soon as there is an abscess and it enters there the situation is changed. You may find various bacteria there; if it becomes a closed abscess, a certain number of those bacteria

die out and others remain. When finally examined by the surgeon it does prove sometimes to be a pure infection with streptococcus viridans. The surgeon should, in removing a tooth, use all aseptic precautions.

I mentioned before, if you do not find *streptococcus viridans* there is something the matter, and the surgeon must have put some antiseptic there; but if you do find it there, in the depths of the abscess, it probably came originally from the mouth. Evidence points to the primary source being in the mouth. It does not prove it absolutely, of course.

Dr. Ottolengui—We only have brought to us here pictures of arthritis that are associated with streptococcus infection at the ends of roots.

Let me tell you a little story. A lady came to me and while she was being attended to, her little boy, who accompanied her, was rather restless, and she asked me to tell him a story. I told him of a little boy who persisted in eating with his knife, and one day, just as he had his knife in his mouth, a fire engine went by, and he turned his head suddenly to listen to it, and he cut his mouth. Well, he digested that, and then he said, "Now tell me about a boy who ate with his knife and didn't cut himself!"

How about the cases where there is an arthritis, and no infection at the ends of the teeth?

Dr. MacNeal—Arthritis is, of course, not always secondary to tooth abscess. Dr. Billings and Dr. Rosenow, who are largely responsible for the interest in this subject, have pointed out that it is necessary to assume a primary focus somewhere, where the organisms have penetrated through mucous membrane. That focus may be in the prostate, or in the urethra, or in the ethmoid cells, or in the tooth root. This being a dental society, I suppose Dr. Schamberg would not discuss those cases arising from prostatic infection. To say that the discussion of peridental abscesses covers the whole field of arthritis would be untrue; but it does present a portion of it that is interesting to the dentist.

In regard to the proof of the relation of the primary and secondary nature of these lesions, it is as I said, a little early to say that it is definitely proven; but we hope that the relation may be proved to be true.

I believe, as you do, that it is a little early to say: "There is the tooth, and there is the arthritis."

Dr. Ottolengui—I do not want anyone to go away with the idea that I doubt the possibility of this theory. I believe it very plausible, and very probable, but I assert absolutely that it has not been proven, and I do this to induce you to bring more proof.

Whether this kind of root filling exhibited to-night in the slides produces arthritis or not, that kind of work is a disgrace to dentistry, to our examining boards, and to our dental colleges.

Dr. M. L. Rhein—Realizing how late the hour is, I would merely say that no one appreciates more than I do the inordinate value that Dr. Ottolengui has given this uplift in dental therapeutics. His desire to have the cause and result proven to him has become a sort of obsession with him. I believe that the proof is not nearly as difficult as he has intimated to-night.

Of course, he is correct in the assertion that it is necessary to have a succinct history of every case, and we all realize the difficulty of getting the history of all such cases.

He has heard me give the history of a case of arthritis, where the death of the pulp was traumatic—where it had never been entered into. I will just briefly relate it, and I claim that it is an absolutely proven case of cause and effect. To the different post-graduate sections I have had the pleasure of talking to, I have shown the röntgenograms of this case.

A young girl, aged twenty-one, who had been my patient for about fifteen years—mouth beautifully kept—impossible to say anything about it—goes to Italy. On the way over, in a storm, she is thrown from her upper berth, and her whole face badly mashed. No suspicion of anything wrong with the teeth. Within a few weeks after she reaches Italy, she commences to get a swelling over the knee, and after about a month and a half she has to resort to crutches. For about a year and a half she remains in Italy, and then returns to this country on crutches. She came into the hands of Dr. Towns, of this city—a specialist—but he was unable to do anything for her. She lived in the suburbs, and her mother told me one day that they were so much disturbed about her daughter's knee that they had not had time to bring her in to see about her mouth.

One day they telephoned me that she had some little disturbance in her mouth. When she came in to see me, she said: "I am afraid I am here under false pretenses, because I wanted to see you, Doctor. This little disorder in the mouth had not lasted more than a minute." She pointed to one of the upper teeth, and when I saw it, not having been told of this accident on the steamer—all that I had heard from the mother being that the young lady's knee had swollen when she reached Italy, and that she had not been able to walk without crutches. I said: "Agnes, you must have had some accident." I realized at once that there was a traumatic death of the pulp in the second bicuspid.

Under the most careful aseptic measures, I opened this up, and found a fluid which I immediately drew into a sterile glass pipet which I keep for such purposes, and placed it in a sterile tube, and sent it at once to Dr. Simon Flexner, asking him if he would not give this his personal attention.

At the expiration of three days, he told me he did not know whether he would get anything out of it, or not. He said it was one of the least active infections he had ever handled. It was only after five or six days that he was able to get an absolutely pure culture of streptococcus viridans.

I did not wait for his report. I immediately removed that pulp, and eradicated the entire nidus of infection, and within two weeks that young woman threw her crutches away, and she has had no return of that arthritis. It is a case that Dr. Schamberg saw under other conditions, and I believe that a history of this sort is as clear a proof of cause and result as we can get, because otherwise there was no possible infection.

Of course, it is difficult in all instances to trace a case as perfectly as you can a case of traumatic death of the pulp.

I do not know whether some of the speakers meant to convey the idea that the removal of the cause of the infected nidus in severe arthritis does not produce a cure, but if they do, I am absolutely opposed to any such statement, because I have seen plenty of cases of the most pronounced kind of arthritis where the thorough removal of all the teeth has absolutely produced the greatest benefit.

Two other things I want to inject in this discussion. I do

not think Dr. Schamberg wanted to cast any slur on the passing of the root canal filling through the end of the root, because after the infection has been removed, the only way the dentist has a right to leave a pulpless tooth in the jaw is to have the periapical end of the root absolutely sealed. The fact that infections of this kind occur in cases where root canal fillings are passed through, does not prove anything. I have perhaps twenty-five cases recorded, where the root canal fillings have gone through, and where everything is done aseptically.

Dr. Chace spoke of pus, but I do not think he meant it. In most of these cases, there is absolutely no sign of any pus, and this is the important thing I want to leave in this discussion—that in these cases where it is the streptococcus viridans that is the infection, we almost invariably get no pus.

In this case I speak of—a year and three-quarters after the infection I opened the tooth and found a reddish-brown fluid. The reason for this is that the streptococcus viridans has such a low form of virility, that although it is sufficient to produce irritation, it may not produce pus.

Many dentists imagine that in order to have infection you must have pus. That is one of the erroneous ideas that has pervaded the mass of the profession. A streptococcus viridans when it produces an infectious nidus, manufactures the toxins that would come from pus in the same manner without pus being present, and it is important that this be distinctly understood.

Dr. Schamberg (in closing)—I do not know of any greater compliment that Dr. Ottolengui could pay me, than to say he was disappointed that I did not come here with the complete direct evidence as to the relation between these local infections, and more particularly the arthritic troubles. I should indeed be worthy of his friendship if I came with that evidence.

I do however want to answer several of his statements or queries. In the first place some cases of arthritis are cured by the removal of the cause in the mouth without the vaccine treatment—others are treated by the removal of the cause in conjunction with the vaccine treatment, and others are only improved or held in check. The state or progress of the disease in the joint determines the amount of cause the removal will have on the effect.

Dr. Ottolengui wants us to prove that these organisms are responsible. Circumstantial evidence must abide when direct evidence is absent, and we have sufficient circumstantial evidence to feel confident of the fact that they are the cause. You may suspect a servant in your house of abstracting some money from your cash drawer. You may have other things disappear. You must have reasons for your suspicion. The fact that there is a servant in the house may be one suspicion. That is not sufficient, but when you find that upon the dismissal of that servant, the money no longer disappears, you have pretty strong evidence that that servant took the money. And the fact that no money has returned to the drawer is no proof that she did not steal it.

We have more evidence in regard to the streptococcus viridans producing these various tests, when men like Rosenow find these streptococci on the heart valves, and in the joints, and produce them there; and it is immaterial to me whether the organism is introduced on the broach, or whether in leaving an unfilled root you are producing an area that is a favorable medium for the growth of these organisms.

Rosenow has proved that environment with organisms is a very important factor. You can throw a human being with moral instincts into bad company, and he may become a criminal. Throw him into another environment, and he will remain moral.

In the masticatory function and the constant pumping of that on that cancellous structure, you are dealing with a dangerous spot.

I did not intend to come before you, and give you the full history of these organisms from the time of their appearance in the universe up to the time they reach the heart valve, or stomach; but I did want to make a plea for the elimination of them; for whether they are directly or indirectly responsible, they are a potent factor in poisoning the systems of our patients, and I do not know that any other point in medicine has been more conclusively proven than that.

Adjournment.

WM. J. LEDERER, D.D.S.,
Editor, First District Dental Society.

THE BOSTON AND TUFTS DENTAL ALUMNI ASSOCIATION

October 13, 1915

The regular October meeting of the Boston and Tufts Dental Alumni Association was held at Hotel Lenox on the evening of Wednesday the 13th.

The business meeting was called to order by the President, Dr. F. A. Sawyer of Cambridge, at 6.15 o'clock. Various reports were read and committee reports were received. The executive board gave notice that it had been thought advisable to issue an engraved certificate of membership to every member and sample of same was submitted. In the near future each member will receive one of these engraved certificates and payment of fifty cents cash will be collected with the annual dues.

After the business meeting adjournment was in order to the banquet room where a very enjoyable dinner was served.

The speaker of the evening was then presented by President Sawyer, and proved to be Dr. William H. Potter, Professor of Operative Dentistry, Harvard University Dental School. The topic was "The Work of the Dentist in the Great War." Dr. Potter was a member of the staff of dental surgeons at the ambulance of the American Hospital in Paris. The talk was of great interest and gave one a good idea of the scope and quality of the work done by the dental surgeons. The pictures thrown on the screen were unusually clear which helped in no small degree to illustrate the subject.

It would seem almost impossible to do very much with some of the cases when they came into the hands of Dr. Potter and his associates, yet when finally discharged an almost miraculous change had been effected. The pathetic thing about it all was that these same men were usually on their way back once more to the firing line.

A hearty vote of thanks was extended to Dr. Potter for his most interesting and instructive talk. Adjournment was at a late hour.

A. G. RICHBURG, D.M.D.,
Editor, B. & T. D. A. A.

THE JOURNAL OF THE ALLIED DENTAL SOCIETIES

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NEW YORK, DECEMBER, 1915

No. 4

EDITORIAL DEPARTMENT

THE DENTAL CURRICULUM

The general adoption of the four-year course, to begin in 1917, by the dental colleges throughout the country, is sufficient evidence that the curriculum of three years has proved inadequate. This conclusion was inevitable, for the dental graduate in the past has lacked the theoretical and practical knowledge of medicine in general and of dentistry in particular.

The dental specialty has taken its natural place as

an essential part of general medicine, and not only our medical faculties but our public men of financial power are aiding in bringing about the founding of suitable institutions of learning, whereby the dental graduate in times to come will be equipped adequately to care for the human body from his special viewpoint. This presupposes a broad knowledge of general principles well compacted with high technical qualifications. The four years' course is absolutely needed to attain even a moderate degree of success in such a program.

The problem is a most intricate one. Modern dentistry demands varied and positive capabilities. The practitioner should have the maximum of general medical knowledge consistent with the special training necessary to make him a competent dentist. Highly elaborated processes involving mechanic and artistic principles must be mastered by the student; digital skill must be acquired by training which is comparable in point of time and difficulty to that of the musician. This is true of no other department of medicine—in anything like a similar degree. Hence the dentist, while he *should* be a good physician, *must* have these added qualifications in order to practise his specialty. Therefore the question presses: What constitutes a curriculum which shall meet these varied needs within the four years prescribed for the regular medical course?

It may be stated at once that the preliminary re-

quirements should be those demanded of the medical matriculate, and that in total working time and academic credit the dental course should be the equivalent of the medical, as prescribed in our leading universities. The first two years would naturally be nearly parallel in the two courses, but some divergence will exist from the beginning. The dental student should know from the first that he is to be a dentist.

The one-time notion that the medical course would produce a dentist has proved fallacious. The State of Virginia, on March 14, 1910, enacted a law that no person in that State should practise dentistry who had not complied with the requirements of the Virginia State Board of Medical Examiners. This law was rescinded January 1, 1914. Referring to this experiment, in an excellent editorial, Kirk¹ states:

The expectation that the highest efficiency in dental education and practice may be attained through the training afforded by the conventional medical curriculum is a futile one, because in brief terms the medical curriculum does not fit the demands of efficient dental practice. Nor can it be made to do so, for the self-evident reason that the trend of all educational curricula is toward adaptation to special ends, mainly utilitarian, and the medical curriculum will constantly evolve toward the ideal of making better physicians, while that of dentistry will develop toward making more efficient dentists—utilizing for that purpose all of the resources of medical science and art that are adaptable to its purposes.

The compromise necessary to meet modern conditions will call for the highest ingenuity and wisdom

¹ E. C. Kirk, *Dental Cosmos*, June, 1914, p. 759.

on the part of our educators. It may confidently be stated that such an adjustment can only be made, even though imperfectly, by the close and sympathetic affiliation of medical and dental faculties, under university control.

Let us acknowledge gratefully the debt modern dentistry owes the private institution, for having carried dental education through its early years of discouragement and difficulty. The chronicles of those early struggles show manly independence on the part of our pioneer educators, and their successors have made dental science what it is to-day. But the inherent superiority of the university dental school, from the many examples now existing, has been proven and is self-evident. New York City has been tardy in realizing the need of a dental college operating with the facilities of a great university, but signs of the times justify the hope that such a consummation may be looked for in the not distant future. Our greatest municipality cannot fail in a need so closely associated with the health of its millions of inhabitants.

A SPECIAL AMERICAN HOSPITAL IN PARIS FOR WOUNDS OF THE FACE AND JAW

Trench fighting has advanced so greatly the percentage of head wounds in modern warfare that in these days of unparalleled slaughter oral and facial surgery takes a dominant rank in the great needs of mankind. More surgeons—better surgery: without

visible limit those demands will persist throughout this terrible conflict and for many years thereafter. Our profession faces this responsibility—this unprecedented opportunity—to serve its fellow beings.

Information is given on another page² concerning the work, to date, of the American central and local committees now raising funds for the founding of "A Special Hospital in Paris for Wounds of the Face and Jaw." Our readers are urged to coöperate with these committees now established in twenty-one cities throughout the United States, by obtaining literature which may be had for the asking, and by distributing the same in favorable quarters. It is very gratifying to announce, as we go to press, that the first \$20,000 has been received, and that an immediate start is to be made in a building to be provided by the French Government, on the basis of 100 beds.

The work commends itself, and calls for instant and cordial response from dental practitioners everywhere. Professional men usually are not wealthy, but they are influential, and in what better cause may such influence be exerted? *THE JOURNAL* makes this appeal on that ground which must ever be the physician's highest obligation and privilege—the relief of human suffering.

² See p. 540

CORRESPONDENCE

THE DENTAL COSMOS

PHILADELPHIA, Dec. 17, 1915.

Office of the Editor.

Dr. Wm. B. Dunning, Editor, THE JOURNAL OF THE ALLIED DENTAL SOCIETIES, New York, N. Y.

DEAR SIR:

My attention has been directed to a statement printed at page 161 of the June, 1915, issue of THE JOURNAL OF THE ALLIED DENTAL SOCIETIES, in an article by I. J. Kligler, entitled "Oral Microorganisms," as follows: "Kirk (1914) advanced the hypothesis that bacteria penetrate the enamel and ferment sugar from the blood plasma, thus liberating acid which dissolves enamel from the inside," concerning which I desire to say that I do not now hold, nor have I at any time entertained, such a view, and to the best of my knowledge and belief I have never made any statement, either verbally or in print, which even by the wildest flight of imagination could be misconstrued as advancing such an absurd hypothesis as has been attributed to me in the quotation above referred to.

Very truly yours,

EDWARD C. KIRK.

COLUMBIA UNIVERSITY

DEPARTMENT OF BIOLOGICAL CHEMISTRY

COLLEGE OF PHYSICIANS AND SURGEONS

437 West 59th Street

NEW YORK, December 21, 1915.

Dr. Wm. B. Dunning, Editor,

JOURNAL OF THE ALLIED DENTAL SOCIETIES,

New York.

DEAR DR. DUNNING:

Replying to Dr. Kirk's criticism, as published above, of a statement in Dr. Kligler's historical résumé, which I approved and for which I am accordingly responsible, I desire to say that the quoted allusion to Dr. Kirk's "hypothesis" was a *casual* reference to "theories" of dental decay. The numeral in parenthesis, "(1914)," refers the reader to the concluding bibliography (p. 165), where the original paper by Dr. Kirk was indicated (*Dental Cosmos*, 1914, lvi, p. 1), and where all of Dr. Kirk's statements on this "hypothesis" may be found.

On pages 10 and 11 of that paper, Dr. Kirk states: (1) "The direction of progress of dental caries (the context indicates 'progress' resulting from the action of acid-producing bacteria) is *from the free surface of the tooth* toward its interior, until finally the pulp chamber in *invaded*."

(2) If we examine under the microscope a section of carious dentin cut parallel with the tubuli, we find the *bacterial invasion* proceeding pulpward from the dentino-enamel junction . . . (3) then it seems rational to conclude that the *blood plasma*, or its equivalent in the juices of the dentinal fibrillæ, can furnish a sufficient amount of *carbohydrate* material for the nutrition of caries-producing organisms. . . . (4) It is of interest in this connection to note that the majority of *acid-producing bacteria* concerned in caries of dentin will grow upon *blood serum*."

The statement which Dr. Kirk quotes from Dr. Kligler's paper, and to which Dr. Kirk objects, although merely a three-line "pointer" in a brief historical summary, appears to me to be a correct indication of that part of Dr. Kirk's published "hypothesis" to which we plainly intended in general to refer. Sections 1 and 2, in the preceding paragraph, giving a direct quotation from Dr. Kirk's "hypothesis," imply a belief by him, in accord with current understanding of the matter (see also Kirk: *Dental Cosmos*, 1915, lvii, p. 1402), that "*bacteria penetrate* (i. e., enter, make way through) *the enamel*," as we stated. Section 3, in the preceding paragraph, mentions "carbohydrate material" from the "blood plasma" ("sugar" in Dr. Kirk's text), which is the "*sugar from the blood plasma*" to which we referred in stating his "hypothesis." Sections 3 and 4, in the preceding paragraph, indicate Dr. Kirk's idea that the "caries-producing organisms" ("acid-producing bacteria") "*ferment sugar from the blood plasma, thus liberating acid*," as we stated. It is obvious that acid produced in this way, from sugar "in the juices of the dentinal fibrillæ," would "*dissolve enamel from the inside*," as we asserted; unless, of course, such acid is *never* produced in excess, and unless *all* the enamel over the affected dentin is removed before the involved dentin is cariously changed to any degree—assumptions we did not make and which Dr. Kirk's paper does not suggest.

Our papers on this subject, as may be observed by any reader (see also pages 445, 459 and 464 of this number of this JOURNAL), have dealt primarily with influences that affect enamel; and, in writing the very condensed statement to which Dr. Kirk objects, our attention was mainly directed to a consideration of effects on enamel. The reader will find that our allusion to Dr. Kirk's "hypothesis" was in no way critical, merely incidental. It was our purpose, in referring to it, to bring out, in a word, the "subsidiary" feature involving the possible rôle of "*sugar from the blood plasma*."

I regret that Dr. Kirk did not see fit to state frankly just what is wrong with our miniature of his "hypothesis," instead of merely denouncing it. Perhaps he has made the mistake of reading into our brief statement, that he quotes, alternative meanings that do not necessarily follow from the words? I am sorry that Dr. Kirk did not give us an opportunity, after private inquiry by him, to make whatever public correction the facts, as he sees them, may require.

Yours sincerely,

WILLIAM J. GIES.

NOTES ON PRACTICE

COMPILED BY WILLIAM D. TRACY, D.D.S.

To Remove Plaster from Vulcanite Plates.—Place the well-washed plate in a saturative solution of sodium thiosulphate over night. The plate can then be easily washed clean when taken from the solution.—*Record*.

Pyorrhea Alveolaris Begins in the Gums.—Perhaps no more conclusive argument can be adduced on this point than the fact that every dentist has noticed that the removal of infected teeth results ninety-nine times out of a hundred in cessation of all inflammatory symptoms. The second corroborative fact is that removal of the infected porous root surface usually checks all types of interstitial gingivitis quickly if the work be accurately done, but if the tooth's surface be neglected and dirty, gingivitis recurs. In the observation of more than two thousand cases, the author has found no variation from this general rule, except in cases of acute diffuse nephritis, diabetes-mellitus, and certain types of drug poisoning.—T. B. HARTZELL.

Sealing Pyorrhea Pockets after Operating.—Dr. Hartzell, in the September *Review*, gives the following description of Adair's treatment: Take Merck's beechwood creosote saturated with all the iodine it will dissolve. This makes a heavy black oily mixture and is to be applied to the gum edge and to the neck from one-eighth to a quarter of an inch to the gum edge and reaching up on the tooth neck to the enamel of the crown. Carefully preventing the saliva from touching this after it has been placed, we immediately apply a second coat composed of glycerin in which we have incorporated all the tannic acid that it can be made to dissolve. Thus the tannic acid most completely covers the first coat of creosote-iodine, and, if it is placed before moisture comes in contact with the creosote-iodine, the two solutions seem to unite and form a dense, tough, black-brown material which will cling to the tissues from twenty-four to forty-eight hours, protecting the gingival margin from a bacterial incursion for that period of time. If thought advisable by the operator, the coating may be repeated every other day for several days, thus maintaining a condition of approximate asepsis. The author states in passing that the application of this double coating to sutured incisions in the mouth protects these edges from infection and renders a wound much more comfortable than otherwise would be the case. It may also be applied to the cut edges where third molars have been uncovered by removing the gum. As soon as the bleeding has been checked by the application of hot packs, the cut surfaces may be coated with this heavy iodine solution followed by the tannic acid glycerin solution and the cut surface will be protected from infection and also from the irritation of the movement of the tongue.

Treatment of Pockets.—In the treatment of pockets, the less instrumentation used to remove the deposits upon the roots of the teeth the better. There being no dead bone present, the alveolar margins should not be scraped, since they will take care of themselves. All that is necessary is to give nature a chance. Naturally the alveolar process, owing to its transitory nature, is better prepared to take care of itself than any other bone structure in the body. Instrumentation should be limited to avoid infecting the tissues, should pus germs be present. Much pain inflicted by so-called specialists can thus be avoided. Halisteresis and perforating canal absorption producing pockets, may occur around any one of the teeth in the mouths of people over thirty years of age. Pus is only present in a very small percentage of patients; since, therefore, there are many pockets without pus, there should be a new classification of the pathology in connection with this disease.—E. S. TALBOT, *Cosmos*.

To Remove Broken Drill from Canal.—I lately tried this plan with perfect success. Drill a hole up alongside the broken drill deep enough and wide enough to admit a small wheel bur; then hold the wheel bur against the shank of the broken drill and turn the engine backward. The teeth of the bur engage the drill's shank, which is rotated and thus unscrewed. In the case mentioned, it at once came out "a-skooting."—S. J. SPENCE, Chattanooga, Tenn.

Method of Removing a Shell Crown.—The work of removing a shell crown without mutilating it to such an extent that it must be made over is often a very difficult operation. A simple method is to use a bi-beveled or spear drill, making a small opening at the solder line between cusp and band, inserting a broken instrument in the opening thus gained, using a slight rotary motion, thereby breaking up the cement union between cusp and tooth. With a little time and care one is enabled to remove the crown without distorting the cervical contour, leaving the repairing a very simple operation.—*Pacific Dental Gazette*.

Extracting Badly Broken-Down Molars.—Take a cross cut fissure bur and separate the roots. In the upper molars cut mesio-distally, then bucco-lingually. In the lower molars cut bucco-lingually and extract the roots separately. You will produce less trauma to the surrounding tissue, repair will take place in a shorter time, and it simplifies extraction to the minimum, especially when the roots diverge greatly or the roots are curved. If extraction is to take place under a general anesthetic, I paint the field of operation with tincture of iodine, then proceed to separate the roots. When completed I then administer the anesthetic. If local anesthetic is used I first inject, and by the time the roots are separated the parts are well anesthetized.—FRED F. SCHWARTZ, *Review*.

Means of Producing Local Anesthesia.—The successful practice of local anesthesia involves the carefully adjusted co-operation of a number of important details, each one constituting a definite factor in itself, which, when neglected, must necessarily result in failure. As a whole,

the practice of local anesthesia by the hypodermic method represents the composite of the following factors:

1. A solution of active ingredients corresponding to the physical and physiologic laws which govern certain functions of the living cell.
2. A carefully selected hypodermic armamentarium.
3. A complete mastery of the technique.
4. A proper selection of the correct method suitable for the case in hand.
5. Good judgment of prevailing conditions.—HERMANN PRINZ.

Prevention of Dental Caries.—It is a significant fact that physiological chemistry is undoubtedly to play a large part in the solution of many phases of the unsolved problems of caries, pyorrhea and other oral diseases, and that the dental profession must look largely to workers in this field for help in the development of the dentistry of the future.—W. H. O. McGEHEE, *The American Dentist*.

Prophylaxis of Pyorrhea Alveolaris.—E. L. Fisk, in the *Lancet-Clinic* for September 11, 1915, states that there is considerable evidence tending to incriminate endamebae as the cause of pyorrhea. These organisms are believed by some to be almost universally present, and this has suggested that they may be normal residents of the human mouth and harmless parasites. There is reason to believe, however, that some degree of gum impairment or infection is also very widespread, and that it is therefore advisable to take measures to destroy the endamebae wherever found. Emetin, used with success in amebic dysentery to destroy endamebae, is contained in ipecac, and Fisk calls attention to the fact that a simple, harmless preventive of pyorrhea is available in a mouthwash made by adding two drops of fluid extract of ipecac to a half glassful of water, which is to be used before retiring. This, it is stated, will not be of service in well established cases of pyorrhea, but in the earliest stages it may check the condition.

Separating Modeling Compound Impressions.—In taking modeling compound impressions, the compound may easily be separated from the cast if the impression is painted with a thin solution of shellac before it is poured. A most perfect impression may be obtained if the compound be vaselined and held under a stream of hot water for a few seconds just before the impression is taken.—R. DAVIS, *Dental Review*.

Some Special Uses for Soap.—A small piece of pure soap will be found useful in many ways during operations. The mouth-mirror may be kept from clouding by coating the glass with dry soap and then wiping clean with a dry napkin. The edge of a sandpaper disk will not catch in the rubber dam when polishing fillings if it is first run in the soap. Disks and strips will cut faster and with less friction. Disks and strips thus prepared, that are used in polishing gold, will retain the particles of gold, and if saved and refined will more than pay for the trouble. Use

pure soap sparingly, and it will not be disagreeable to the patient.—J. C. HOPKINS, *Pacific Dental Gazette*.

A Special Use for the High Frequency Current.—Some months ago I purchased a Rogers High Frequency outfit and have been able with it to reduce cavity sensitiveness to a point within the limits of comfort by applying the current to a piece of cotton saturated with carbolic acid from one minute to a minute and a half. Patients have frequently expressed their relief and have stated they did not think they could have had the tooth excavated without it.—“*Around the Table*,” *Items of Interest*.

To Sharpen Cross-cut and Inlay Burs.—When your cross-cut and inlay burs become dull from use in shallow cavities trim off the end on a fine lathe wheel. It destroys the end cutting but the side is just as good as a new bur would do. Don't hold too long against the stone as it will spoil the temper of the bur. I use this method with inverted cone burs when the corners get dull.—W. A. CASH, Butte, Mont.

Sterilization of the Right-Angle Handpiece.—It is very important that the right-angle attachment be sterilized after each use, inasmuch as it comes in contact with the mucous membrane of the mouth and the saliva. A method which I have followed during the past five years is to boil it thoroughly in water to which has been added powdered Castile soap, about one teaspoonful to the quart. After boiling, the excess of soapy water is shaken from the instrument, and a small drop of oil placed upon the gearing. The soap prevents rust and furnishes a certain amount of lubrication for the running parts. This method can also be used for the straight handpiece if it can be detached from the engine. If there are hard rubber parts connected with either handpiece, they can be boiled for a long time without essential damage.—WM. H. POTTER, *Dental Mfg.'s Quarterly*.

To Keep Gutta-Percha Points Sterile.—Use three clear glass dental medicine bottles filled with alcohol, and place the different sized points in them. In this way you always have sterile points of the various sizes ready for immediate use.—FLOYD E. CLINITE, *Dental Digest*.

Polishing Vulcanite Dentures.—After having filed and scraped a vulcanite plate, instead of using sandpaper, a mixture of one part of emery powder and three parts of powdered pumice is employed for finishing and polishing, affording considerable economy in time.—*Le Laboratoire et le Progres Dentaire*, *Dental Cosmos*.

To Obtain Duplicates of Plaster Models.—Soak about 150 leaves of common gelatin in cold water for from one to two hours, gradually adding four or five ounces of oil, constantly stirring. Place the model in an enamel vessel and pour the above mixture over it. After about three hours it will have hardened, when the model may be removed and any number can be poured.—F. A. B., *Dental Office and Laboratory*.

Removal of Amalgam Fillings.—Hold a heated instrument on the filling until the heat is felt in the tooth. Bur out at once, when it can be

cut like cheese. Use an instrument having a very slender shank with a bulbous end, one of the old "Wood's Metal" fillers of forty years ago. The slender shank prevents the heat from radiating too rapidly.—A. H. BROCKWAY, *Dental Digest*.

To Mend a Broken Plaster Model.—The effort to mend a broken plaster model with any of the oxy-phosphate cements is likely to be much more successful if the parts to be joined are first thoroughly moistened with the cement fluid. Then mix cement thin in the usual way and apply to both surfaces. Secure adaptation and then allow the cement to set without being disturbed. Under these conditions the union is likely to be very strong. Never mend a model which is to be subjected to high heat in the above manner. If a bridge abutment breaks off before the bridge is soldered, mend it with wax or plaster or sealing wax. A cement repair under this condition would cause the abutment to move when heated, since the cement would boil and ruin the bridge.—G. W. C., *Dental Digest*.

Setting a Crown.—In setting a crown that has a pin for the pulp canal it is often difficult to be assured that the cement is in the bottom of the canal. Place a dab of cement over the cavity, and with a fissure bur in the handpiece, reversing the engine, work the cement quickly to the bottom.—J. H. BEEBEE, *Dental Digest*.

CURRENT NEWS

Items of professional news, of general interest, will be welcomed by the Associate Editor at 51 West Forty-seventh Street, New York City.

On November 17th, Dr. C. Franklin MacDonald, Jr., whom the readers of *The Journal* know personally and through his writings, sailed with the latest installment of the Harvard Unit for the war zone. We are sorry to lose Dr. MacDonald, even for a period of approximately six months, but we feel that he is qualified ably to assist in the remarkable operations and results achieved by so many of the dentists, who have been working in the hospitals since the start of the world war.

For the benefit of a few, let us explain that the first expedition financed by Harvard University, called the Harvard Unit because all those included were to remain in one locality as it was felt that more could be accomplished in this way, sailed for England on June 26, 1915. In this party were three dentists and about thirty surgeons, all Harvard graduates, besides many nurses.

During the past summer, Dr. Kazanjian, assisted by Dr. Ferdinand Brigham and Dr. F. H. Cushman, by his wonderful jaw surgery, has astonished and won the approval of the British surgeons. All three have been made lieutenants in the Royal Army Medical Corps and the British authorities have promised Dr. Kazanjian a special dental hospital, equipped as he wishes, to be the base for the treatment of the complicated fractures and wounds of the head, the patients to be sent from the various field hospitals.

Truly this is a remarkable achievement and the good accomplished can hardly be estimated by those of us who are in this country. Dr. MacDonald is now working under Dr. Kazanjian and is contributing his part toward relieving the terrible suffering.

It is interesting to know also that the British war office cabled to President Lowell of Harvard, asking that Dr. Kazanjian be granted an indefinite leave of absence and that the former, after consultation with Dean Eugene H. Smith, acceded to this request.

* * *

On October 14, 1915, a handsome memorial fountain in the rose gardens of Forest Park, Springfield, Mass., was dedicated to Dr. Chester Twitchell Stockwell, who passed away four years ago.

Among those who honored the memory of this well-known and beloved man was Dr. Charles M. Proctor, President of the Massachusetts Dental Society, who delivered a scholarly address upon his life and work. Dr. Proctor spoke as follows:

For three score years and ten, Dr. Chester Twitchell Stockwell responded to the best suggestions which life held out. There was never a time from the moment of his existence when his character and personality ceased in development. He was a man of rare character, devoted not only in the promotion of the good name and well being of the profession he so zealously loved, but by a closer contact with nature he was enabled to suggest a larger method of living.

whereby the true values of life in their relation to the hereafter were pointed out to his fellowmen.

It was a privilege to have had this man as a friend. I regret exceedingly that this pleasure was denied me personally but that I have the value of his words and thoughts in the printed text, is to me a pleasure and through them he is my friend. He possessed in every trait, essentials which, as we look upon them, are the ideals of mankind. Mean and petty jealousy, discontent and unhappy strife had no place in his life. It was the broad view of the universe into which he looked which makes his memory of such rare value to us.

As it was his pleasure eleven years ago to assemble with his colleagues that they might bestow upon him, honors consequent on a well spent life, so now is it our pleasure to assemble here in honor of the memory of this man, and to feel with just pride that we had him as a friend and counsellor. It is often said that a service like this is for the living and not for the dead. So far as we know the dead have passed beyond our reach; they cannot feel the touch of our hand, they cannot hear our voices, they do not answer to our clasp or word. The living can hear us, they can respond to our greeting and to them we can bring inspiration and sympathy. All this sounds conclusive; it seems to reduce the call of this hour to the recollection of precious memories. Yet man is not flesh and blood alone.

Our departed friends have a reputation, and we can serve them by giving a fair estimate of their earthly lives and of their character. Even as a living man can serve another living man by a jealous guarding of his name, so a living man can serve his dead friend by setting forth and summing up his career—the issue of his mind and heart—so as to give those who have known him a still deeper appreciation, and to the stranger a just rating of a strong life. In this spirit I shall try to speak of him, whose memory we delight to honor. I frankly confess my inadequacy. To speak of him in the terms of general human nature would not suffice. His individuality was distinctive. One's impression of him was that of reality. He was genuine. When he expressed himself, the expression was true. How strong, too, was the impression of his intellectuality. His mind lived in high regions. He was born for knowledge, he was an inquirer.

Even though Dr. Stockwell did not graduate from an institution of learning, we know from his character that he would ever have been a student and a scholar; his very nature of delving into the mysteries of the unknown, could only develop such, regardless of the honors which any university could confer upon him.

There was nothing of the pedant about him, his reality prevented him from being an intellectual Pharisee. He was a purist in speech; his language was exact and accurate. Association with him was a process of culture not because he assumed the air of a teacher but rather because he had ever the mood of the real scholar and with it all you must agree that his life had a tone of spirituality with a logical thought of the hereafter, as witnessed in his book, "New Modes of Thought." Herein then is comfort to those whose lives were closely mingled with his and to his friends an inspiration for a better well being.

Our greatest tribute to the life of Dr. Stockwell is not in assembling here for the dedication of this beautiful memorial, but in accepting for ourselves the rare characteristics which he exemplified by his life, and as we take away these memories, let us not forget that he has gone but rather that we are blest in having known him.

* * *

The Law Committee of the Massachusetts Dental Society, Dr. A. G. Richburg, chairman, which has been working for some time past on a feasible plan for Group Insurance for the benefit of its members, after due consideration of the various propositions submitted, appointed the U. S. Fidelity and Guaranty Co., of Baltimore, Maryland, as official underwriters

The company makes the following statement:

This Company is one of the largest companies of its kind and one in which every member can place the greatest amount of confidence. The proposition briefly is as follows:

A Group form of policy will be issued by said Company to be held by a Trustee of the Society, and a certificate of insurance to each member, which agrees to protect each of the members of the Society who elects to carry this insurance, against all suits of mal-practice or alleged mal-practice, whether groundless or not, up to a limit of \$5,000 for injury or death to one person, and subject to the same limit for each person a total liability of \$15,000 during the

policy period. In addition to these limits the Company will pay all costs of defense, interests on any verdict or judgment, and any costs taxed against the member.

The cost of this protection to each individual member is \$10 for one year, a saving of 33 1-3 per cent. over what the same contract would cost if bought separately, as the majority of the companies charge \$15 for this insurance and one company has recently increased their premium charge to \$22.

The idea of protection against suits for malpractice is surely not a new one, but the group insurance for all the members of the Massachusetts Society who care to avail themselves of it, is a step forward, as there is a large proportionate saving in the amount of the premium and probably many more men will take out policies than would otherwise do so.

A canvass by the committee before the final arrangements, showed a large majority favoring the plan.

* * *

Dr. Harvey J. Burkhart, of Batavia, N. Y., has been unanimously elected Director of the Rochester Dental Dispensary and he has accepted the position.

It is fitting that this philanthropic institution, donated to the City of Rochester by Mr. George Eastman, should be presided over by a man of such high calibre and unquestioned executive ability as Dr. Burkhart possesses. We heartily commend the action of the Board of Trustees.

Dr. Burkhart, besides being engaged in the practice of his profession, is at present Mayor of the City of Batavia and was President of the Board of Education for many years. He is a former president of the Eighth District Dental Society of New York, the New York State Society, the National Dental Association and is one of the State Board of Examiners. Last, but not least, he is a vestryman of St. James Church.

We congratulate the Rochester Dental Dispensary and Dr. Burkhart and we believe that a great amount of good will be accomplished under his efficient management.

* * *

The registration at Tufts College Dental School shows a larger number of students enrolled than ever before. There are 115 students in the senior class, 156 in the junior and 233 in the freshman, besides one special. Total, 505.

The Tufts faculty will institute the four-year course beginning in 1917 and consequently many changes in the curriculum are in prospect. The Committee on Curriculum is planning a very involved and complex course of study, more time being given to subjects that are only lightly touched upon now, such as Anesthesia, Radiology, History, Ethics, Economics and Jurisprudence.

Courses in several new subjects will be instituted, viz.: Biology, Technical Drawing, Public Speaking, etc., and it is felt that these changes are all distinct improvements and that they will keep Tufts College in the front rank of dental institutions.

BOOK REVIEWS

By C. FRANKLIN MACDONALD, D.M.D.

THE PRINCIPLES OF BACTERIOLOGY. A Practical Manual for Students and Physicians. By A. C. Abbott, M.D., Professor of Hygiene and Bacteriology and Director of the Laboratory of Hygiene, University of Pennsylvania. 12mo, 650 pages, with 113 illustrations, 28 in colors. Cloth, \$2.75, *net*. Lea & Febiger, Publishers, Philadelphia and New York, 1915.

Abbott's Bacteriology is now a recognized standard work upon the principles of this important subject. That the present edition is the ninth speaks for itself as to the evident popularity and usefulness of the book.

The subject matter is in much the same arrangement as the previous edition. The volume is divided into two main sections.

The first part is devoted to the general considerations of bacteria, the preparation of media, isolation of bacteria and methods of study by cultivation, staining, animal inoculation, etc. The last chapters discuss in a most thorough yet concise manner the questions of infection and immunity with the theories involved, the hemolytic system, specific antibodies, Wassermann reaction, etc.

The second edition takes up the application of the methods of bacteriology. In these chapters the individual bacteria are given more detailed study as to morphology, staining reactions, cultural characteristics, pathological properties, etc. The last chapter discusses the bacteriological analysis of water, air, soil, and milk.

This book hardly needs more than to have attention drawn to the fact that a new, and in certain parts, an enlarged edition has been issued and that it contains all the reliable, valuable and essential characteristics of its predecessors. It is a volume eminently suited to the student, as it is complete but not too elaborate. It also should find a place in the library of the practitioner as its details are sufficient for it to serve as an excellent book of reference.

PHYSIOLOGY FOR DENTAL STUDENTS. By R. G. Pearce, B.A., M.D., Associate in Physiology, Western Reserve University, and J. J. R. Macleod, M.B., D.P.H., Professor of Physiology, Western Reserve University. 320 pages, with 59 illustrations, ten colored plates. Cloth, \$3.00, *net*. C. V. Mosley Co., St. Louis, 1915.

Physiology is acknowledged as one of the basic studies upon which medical science is founded. Dentistry is rightly assuming the position of a specialized branch of medicine and it is therefore essential that the student of dentistry receive a good grounding in this basic study.

This present volume has been prepared primarily for the use of dental students. The authors have assumed that the common text books of physiology are too elaborate and contain much subject matter which for the dentist would be quite unnecessary. Following out this idea they have written a book which radically condenses physiological subjects to a point where only the bare essentials of certain phases of this great sub-

ject are considered. As compared to the usual books upon physiology it is but a brief treatise, an easily read, general account, of the more common physiological processes and can hardly be classed as a real text book.

The first two chapters take up the general laws of physico-chemistry, properties of proteins, carbohydrates, enzymes, crystalloids, osmotic phenomena, etc.

Five chapters discuss in a brief way the process of digestion as it occurs in the mouth, stomach, and intestines with the various secretions, chemical changes, absorption, etc. Being a book written for dental students, the chapter especially devoted to the changes taking place in the mouth seems rather meagre. A few chemical tests are given for salivary constituents but there is much of considerable interest and value about saliva and oral conditions which might here be included. Writing of mastication, the authors take occasion to point out the strong necessity of thoroughly chewing food, but say that the so-called "Fletcherization" of food is quite unnecessary and that the individual might "occupy his time with other more profitable pursuits."

A number of chapters are given over to metabolism with the relative importance of proteins, fats, and carbohydrates, and their utilization in the human economy.

In a brief way the ductless glands and the factors concerned in the regulation of body heat are taken up with a consideration of the blood and lymph, its constituents, properties and a short presentation of the theories of the defensive mechanism of the blood.

The circulation and respiration are discussed in six chapters which also include the anatomy and nervous influences. One chapter presents a short account of urine and the excretions of the skin, sweat glands, etc.

The nervous system is taken up briefly in four chapters and presents in a very general way the main points of interest. Two short chapters are devoted to the special senses, vision, hearing, taste, smell and senses of touch and pain.

The volume closes with a chapter upon the muscular system and the organs of reproduction, with an appendix containing experiments for demonstration of a few physiological principles before a class.

If a course in physiology for the dental student is intended to be a more or less popular one, consisting of general lectures and presentation of a few experiments before the class, this book might well supplement this purpose. If, however, the student is to receive a real, working foundation in physiology, with detailed lectures and general laboratory work, this book will not meet the requirements as a text book. It can well be classed as a popular treatise which can be read intelligently by anyone who has a slight knowledge of physiology.

Specialization and judicious selection of material for the education of dental students is probably, at this time, quite necessary, but care must be exercised that the subject matter shall be in sufficient detail so that

the student is getting a very thorough knowledge of the subjects so selected. It seems, fortunately, that the trend of dental education and requirements is to increase his particular knowledge and not to give him just brief, popular accounts of medical subjects.

PRACTICAL ORAL HYGIENE, PROPHYLAXIS, AND PYORRHEA ALVEOLARIS. By Robin Adair, B.S., M.D., D.D.S. Second edition, enlarged and revised. Octavo, 462 pages and 124 illustrations. Atlanta, Georgia: Oral Hygiene Publishing Co., 1915. Cloth, \$5.00 *net*.

The last few years has seen a rapid rise in the interest shown by the public at large and especially by the dental profession towards the subject of oral hygiene and prophylaxis. Considerable valuable matter has appeared in dental publications at various times pertaining to these subjects but there has hitherto been no attempt to compile and sort out the practical data and condense it into a general text.

Dr. Adair in the present volume, essaying this task, has produced a book not only valuable for the facts and suggestions set forth but one that makes interesting reading.

While the author's observations and practical experiences contribute to the subject matter, the contents for the most part have been generously culled from a vast field of contributors. Often whole extracts from prominent men have been quoted in their entirety. Hence, the book has a rather cosmopolitan atmosphere making the reader feel that he is not being presented with the prejudiced viewpoint or ideas of one man, but is being brought into intimate touch with other minds and ideals throughout the dental profession as they relate to the subjects under discussion.

The subject matter is divided into three parts. The first section is given over to practical oral hygiene. The oral hygiene movement and the progress this movement has made is first stated, followed by a series of popular lectures for use before various bodies as mothers' clubs, nurses, physicians, etc., as well as suggestive lectures for school children selected from various authors. In this connection the reading of a lecture for children as written by the late George Edwin Hunt seems like a message from the departed, and those who in life were fortunate to know him, may recall how he might have delivered it with his wholesouled, genial and interesting personality.

Dental inspection and clinics in public schools and institutions are reviewed with information upon such established clinics as those at Bridgeport, Morristown, Forsyth Dental Infirmary, etc. This section closes with a practical consideration of the methods and materials used for cleaning the teeth by the patient and dental operator.

The second portion of the book deals with practical oral prophylaxis and after preliminary chapters devoted to the necessity of this kind of work as presented by the writings of Smith, Jones, Taylor, Rhein, Goble, and others, the various methods of prophylactic treatment are given. Two chapters take up the proposition of the control of patients for carrying

on efficient prophylaxis with the methods of notification cards. The female assistant for the dentist and the dental nurse question receive due consideration as expressed by extracts from the supporters of the dental nurse. The last chapter urges greater attention to the subject of oral hygiene and prophylaxis in the dental schools. The suggestion is made that, for the future dentists to appreciate what a clean mouth means, the students should work on each other and that "while the gums of many will be cut with instruments, tissues lacerated and plenty of calculus left on the teeth, however, it will be worth all the discomfort they endure, for it teaches them the best lesson possible."

The third section of the book handles the difficult subject of pyorrhea alveolaris. Under "causes" all the common theories are presented, but with the weight of evidence preponderantly towards local causes. The author takes up arms against the rather premature assumptions and positive statements of our medical friends, Bass and Johns. His argument is based on the practical observations of numerous careful investigations and while strict and hard hitting it should appeal to all those familiar with pyorrheal conditions as sane and not overdone. It can be recommended for earnest perusal to Drs. Bass and Johns. The pathological conditions of the gums, periodontal membrane, alveolar process, in typical cases of pyorrheal conditions are considered in some detail. Under prognosis the author debates the question whether pyorrhea can be cured or not in a most logical manner. The chapters upon the treatment of pyorrhea make a symposium of the methods carried out by various well known operators. Special operations such as implantations, amputation of roots, splints, etc., receive brief consideration. The use of vaccines and emetin treatments for this disease are concisely presented, the former rather condemned and the latter questioned as to its real value. A chapter takes up the "business side of pyorrhea alveolaris" and in common with a previous chapter presents suggestions open to a variety of opinions, all as one may look at it.

Dr. Adair is to be thanked for his labor in producing this volume embodying as it does most of the best and authoritative matter relating to oral hygiene and prophylaxis. Written in an easy, almost conversational style, eminently interesting, and containing data of value to all progressive dentists this book should find a wide circle of readers and be contained in the modern dental library.

PATHOLOGY AND BACTERIOLOGY FOR DENTAL STUDENTS. By Guthrie McConnell, M.D., Assistant Surgeon, Medical Reserve Corps, U. S. N., formerly Professor of Pathology and Bacteriology in the Philadelphia Dental College. Twelve mo. of 309 pages, with 108 illustrations. Philadelphia and London: W. B. Saunders Company, 1915. Cloth, \$2.25 net.

Dr. McConnell says in his preface that "text books as prepared for medical students contain much that can well be omitted from the dental curriculum." This statement at once designates the main premise upon which this small volume containing both pathology and bacteriology has been carried out.

Material omitted is one feature of the book as the author has likewise greatly condensed the vast subjects, selecting the most important general facts for presentation. From one viewpoint the volume might almost be classed as a compendium except that the handling of the subject matter rather lifts it out of that category.

The first six chapters are devoted to brief considerations of general pathological manifestations as changes in metabolism and circulation, retrogressive processes, and inflammation with its terminations and regeneration of tissue. The following four chapters constitute the remainder of the section upon pathology and take up in a brief, condensed way the more special pathology as the specific inflammations which should be of particular importance to the dental student, tuberculosis, actinomycosis, syphilis, etc.; tumors of various kinds,—fibroma, carcinoma, dermoid cysts, etc.; and the last chapter entitled special pathology of the mouth "presents the common pathological conditions found in the tonsils, pharynx, and salivary glands." The pathological section is entirely concerned with general pathology, there being no attempt made to include the really special pathology of the teeth and mouth.

Bacteriology is handled in exactly the same brief manner, consisting of six chapters. A consideration of bacteria on the whole with their classification and products of growth; sterilization and disinfection; bacteriological methods with culture media and staining; specific organisms presenting their microscopical, cultural and staining characteristics; infection and the theories of immunity, vaccines and antitoxins; and laboratory technic containing the preparation of materials and stains; these are the contents of the portion of the book given over to bacteriology. Here again no special attention is given to data of interest to the dentist. Brief mention is made to the effect that with vaccines "in pyorrhea alveolaris" much success has been attained.

Even though the subject matter has been greatly curtailed and condensed this book contains a vast amount of information in small compass, concisely and clearly put. In the present state of dental education where the student's time is primarily devoted to practical work, a condensed version of pathology and bacteriology is probably acceptable. As the requirements of necessary knowledge for the dental student is increasing and more time is to be given for his education, this book may seem inadequate to fill the conditions unless it be utilized with a most extensive lecture course and outside reading. The volume does not contain sufficient detail to make it available as a book of reference.

OBITUARY

IN MEMORY OF DR. G. V. BLACK.

It becomes the opportunity and joy of comparatively few members of a profession to know intimately its greatest leaders, but it is the privilege of all through imagination, sympathy and reverence to break down the barriers of time and space and enter into very vital relations with what is worthiest in the life of professional men.

With feelings like these the members of the American Academy of Dental Science desire at this time to honor the memory of Dr. Greene Vardiman Black whose recent death strikes from its honorary list a distinguished name and leaves the dental profession everywhere the poorer by his absence, but richer in the inheritance he has left behind him.

Dr. Black's life was unusually varied in its activities within the profession and singularly rich in its accomplishment. He was connected with three dental schools but his great work was done in connection with the Northwestern University Dental School at Chicago, in which he was a professor for twenty-four years and Dean from 1897 to the time of his death. Modest in demeanor, genial and kindly in his relation with his fellows, he was yet filled with a passion to make real and practical what he felt to be important and to enrich the profession with the best of which he was capable. Honors and opportunity for service come unsought to such a man, and they came to him in full measure. He was president of the Illinois Dental Society, first president of the State Board of Dental Examiners, president of the National Dental Association and was awarded medals for his contribution to dental science and literature. His contributions to professional literature were especially numerous and important. For this and much besides it is a satisfaction to honor this eminent member of the dental profession, but it becomes a privilege to honor him in addition for his catholic spirit, his wide sympathy and his manliness. His life work retained interest for him to the last and with the memory of him there will always be mingled the thought of a well rounded character.

WILLIAM P. COOKE,

HENRY H. PIPER,

AMOS I. HADLEY.

MEMORIAL TO DR. W. XAVIER SUDDUTH.

Dr. W. Xavier Sudduth, a distinguished associate fellow of the American Academy of Dental Science, died at Roundup, Montana, May, 1915.

Dr. Sudduth graduated from Illinois Wesleyan University 1873, receiving the degree of M.A., graduated from Philadelphia Dental College 1881, and also studied in Heidelberg and Vienna 1888-1889. He practised

dentistry in Illinois for about two years, when he became connected with the University of Minnesota as Secretary of the College of Dentistry and Professor of Embryology, Oral Surgery and Pathology and was Dean from 1892-1895. He was also much interested in histology and the therapeutic use of hypnosis. His clinical work was oral surgery.

Dr. Sudduth was a man of marked ability, integrity, and resources. He wrote a great deal, contributing to text books, and at one time was editor of the *International Dental Journal*. He went to Montana from Minnesota, taking up his special hobby of horticulture and cattle-raising. He was much interested in the subject of cattle-feeding which led him to the raising of alfalfa. He was known as the "Alfalfa King."

Resolved, That in the death of Dr. W. Xavier Sudduth the Academy mourns one of its most distinguished associate fellows, a man of marked ability and one who was ever an honor to his profession.

WILLIAM P. COOKE,

A. I. HADLEY,

HENRY H. PIPER.

NOTICES

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A SPECIAL AMERICAN HOSPITAL IN PARIS FOR WOUNDS
OF THE FACE AND JAW

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[Copies of the following circular, for public distribution, may be obtained from the chairman of the Central, or any of the local Committees. You are urged to help in this work.]

WILL YOU HELP TO REBUILD MUTILATED HUMAN FACES?
AN EARNEST APPEAL FOR YOUR AID IN ESTABLISHING A HOSPITAL TO SAVE
THOUSANDS OF BRAVE MEN FROM REVOLTING DISFIGUREMENT

The humane men and women whose names appear at the top of this letter are asking your aid.

Your help is needed in the great work of restoring horribly mutilated human brothers to the semblance of human beings.

In the first twelve months of the war the official reports show 6,490,000 wounded. In this terrible sum of human misery there has been little time to think of after effects.

It is nothing that a man's face is shot away. If his life is not in danger he must leave the hospital as soon as possible to make room for a new victim.

Although because of the character of trench warfare, the number of facial wounds has been in proportion far greater than in any other war, the director of a General Hospital has declared that it has been decided on principle not to treat any facial wounds in his hospital.

They are now crowded out because the room is all-imperatively necessary in the never-ending battle to save life.

And there is no hospital for the treatment of these wounds.

The consequence is that a heroic young man may go out into the world in possession of his strength and all his faculties, but with so revolting an appearance that people shrink from him on the street.

Noses are blown off; cheek bones crushed, upper jaws caved in and lower jaws shot away, but there is no time for any treatment except to prevent infection. These horrible wounds are at present entirely neglected. There is no time, no place for them.

One young man was brought back from the firing-line with nothing to show that he had ever had a face excepting two slits under the eyebrows and a few teeth in the lower jaw. Where his face had been was what looked like the crater of some horrible volcano, but he wrote with a pencil, "Don't worry about me. I still have my sight."

With a little help from you and other humane Americans thousands of these young men can be sent back into the world with nothing but a few scars to show. The committee has printed photographs showing these wounds before and after they have been treated by Dr. Morestin, the famous facial surgeon, who has been called "the sculptor of human flesh." It was decided that the "before" were too frightful to be sent broadcast through the country, but if you desire, the person who sends you this appeal can arrange for you to see them.

The greatest facial surgeons in the world have contributed their services to a hospital to be established in Paris for the treatment of these wounds. The French War Office has offered a suitable building. The American Red Cross will supply disinfectants, gauze, bandages, cotton, and other hospital supplies.

It will also give \$2,000 in cash when \$18,000 has been raised elsewhere and may be of future assistance.

For each \$20,000 the committee can establish and maintain one hundred beds. Even one hundred beds will do a great work. Five hundred will do wonders.

Won't you help, if even only a little?

You can send your contribution to the American Red Cross, Washington, D. C. Make your check payable to "The American Red Cross," but be sure to fill out and enclose with the check or money order the accompanying subscription slip so that your contribution will go to the fund for the *Special American Hospital for Wounds of the Face and Jaw in Paris*.

The following form may be used.

*American Red Cross,
Washington, D. C.*

Enclosed herewith is my contribution, \$———, to the fund for the *Special American Hospital for Wounds of the Face and Jaw in Paris*.

(SIGNED)

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or send your check direct to the chairman.

DR. HERBERT L. WHEELER,
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PARTMENT OF EXTENSION LECTURES,
ANNOUNCEMENT.**

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As less than fifty per cent. of the expense of maintaining the service to date has been met by rental fees and receipts from the sale of outfits and there seems to be no reason why the department should not be self-supporting, both rental and sale rates will be advanced November 1st as follows:

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PANAMA PACIFIC DENTAL CONGRESS

The Panama-Pacific Dental Congress has passed into history, and in accordance with the opinion very generally expressed by those in attendance, the meeting was a decided success.

The Pacific Dental Congress Commission of 1915, the corporation now in charge of all matters relating to the Congress, and the publication of the transactions, desires to announce that a copy of the complete transactions, when published, and a copy of the official souvenir program, will be sent to anyone making application therefor to the Secretary of the Commission, Dr. Arthur M. Flood, 240 Stockton Street, San Francisco, California, and forwarding the fee of ten dollars.

Those subscribing for these extra copies of the transactions cannot be regarded as being members of the Congress, not having applied for membership before the meeting, or being in attendance at the same, but we believe these transactions will be a very valuable addition to the history of dentistry, and the souvenir program, containing as it does many items of historical interest and value, will be acceptable to any member of the profession.

PACIFIC DENTAL CONGRESS COMMISSION OF 1915.
 ARTHUR M. FLOOD, D.D.S., Secretary.

CHICAGO DENTAL SOCIETY ANNUAL CLINIC

January 28-29, 1916
Hotel La Salle, Chicago

The annual clinic of the Chicago Dental Society bids fair to surpass in efficiency and enthusiasm our splendid clinics in the past. A notable list of clinicians have been selected and arrangements are under way for a clinic which will place before our guests and members the best in

modern scientific dentistry. The evening meeting on Friday, January 28, will mark an epoch in dentistry. The banquet will be held on Saturday evening, January 29.

Reservations for rooms at the La Salle Hotel, Chicago, may be made any time. Banquet tickets may be had by addressing Dr. S. W. Fahrney, 25 E. Washington Street, Chicago. The official program will be issued January 1. Exhibitors desiring space may communicate with Dr. L. Strong, 30 N. Michigan Ave., Chicago.

FREDERICK B. MOOREHEAD,
President.

PERCY B. D. IDLER,
30 N. Michigan Avenue, Chicago,
Secretary.

FORSYTH DENTAL INFIRMARY FOR CHILDREN POST GRADUATE SCHOOL OF ORTHODONTIA

By the opening of a Post Graduate School of Orthodontia, the Forsyth Dental Infirmary for Children is fulfilling one more of its functions as received in its original plans, and one which was characterized by President Emeritus, Charles W. Eliot, in his address at the dedication exercises, as one of its most important influential duties, the education of the profession and the public.

While the school is not the first to be established in this important field of Dentistry, it is the first to adopt a full academic year of instruction. The curriculum is comprehensive, and includes not only the technical Dental subjects, but also all of the allied Medical branches that have a bearing on the development of the child. The unsurpassed clinical facilities of the institution, which are already demonstrated, will provide the student ample opportunity to acquire the practical experience necessary. Emphasis will be laid on preventive orthodontia. The faculty includes not only local men prominent in their branches, but also a large number of specialists from the East and Middle West.

WISCONSIN STATE DENTAL SOCIETY

December 2, 1915.

EDITOR, THE JOURNAL.

Dear Doctor:

The Wisconsin State Dental Society at their annual meeting held in Oconomowoc, Wis., July 13, 14, 15, elected the following officers: President, O. G. Krause; secretary, Theo. L. Gilbertson; treasurer, Adolph Gropper.

The 1916 meeting will be held in Wausau, Wis., July 11, 12, 13.

Fraternally yours,

THEO. L. GILBERTSON,
128 Wisconsin St., Milwaukee.

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